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FRICK® QUANTUM™ HD COMPRESSOR CONTROL PANEL

(From June 2014)

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SAFETY PRECAUTION DEFINITIONS

DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING Indicates a potentially hazardous situation or practice which, if not avoided, will result in death or serious injury.

CAUTION Indicates a potentially hazardous situation or practice which, if not avoided, will result in damage to equipment and/or minor injury.

NOTICE Indicates an operating procedure, practice, etc., or portion thereof which is essential to highlight.

SECTION 1

INTRODUCTION TO THE QUANTUM™ HD CONTROL SYSTEM

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INTRODUCTION TO THE QUANTUM™ HD CONTROL SYSTEM

INTRODUCTION

The Quantum™ HD panel differs from previous Quantum™ HD panels primarily in the software operating system. The hardware portion has also been upgraded to a 15" color display and touchscreen interface. The Frick® Quantum™ HD control system consists of five major areas:

- **Q5 Processor Board** – The brains of the system. This board will be discussed in Section 3 of this manual.

  The combination of the hardware (Q5 Processor Board) and the software program that runs on it creates what we call the Quantum™ HD system. The Q5 Processor Board communicates with each of the Digital and Analog boards. This communication allows the Quantum™ HD 5 to read the status of all the I/O boards, and display the data on the interface screen. The Q5 Processor Board software acts on this data, and provides the necessary control information to the I/O boards to provide the appropriate control of all input and output signals, based upon the configuration of installed features and options of the compressor package. Operator interaction is provided through an intuitive touchscreen interface. Interaction to the outside world is provided through industry-standard communications protocols, such as ModBus TCP and serial RS-422/485. Additional information about the Quantum™ HD can be found under the Q5 Processor Board sections found in Section 3 of this manual.

- **Power Supply** - Provides the necessary operating voltages for the proper operation of all control components. Additional information about the power supply can be found in Section 4 of this manual.

- **Digital Input / Output Boards** - Digital (on/off) signals are sent and received by these boards. The output signals are used for energizing solenoids, valves, contactors, relays, etc., and the input signals are used to sense the condition of switches, relay contacts, auxiliary contacts, etc. This board runs an independent software program from the processor to control devices, and communicates the status of all devices back to the processor. Additional information about the Digital Boards can be found Section 5 of this manual.

- **Analog Input / Output Boards** - Analog (variable) signals are sent and received by these boards. The output signals are used for controlling VFDs, modulated valves, etc., the input signals are used to read the values being sent from pressure transducers, temperature sensors, etc. This board runs an independent software program from the processor to control devices, and communicates the status of all devices back to the processor. The Analog board has 24 analog inputs, and 8 analog outputs. Additional information about the Analog board can be found in Section 6 of this manual.

- **Operator Interface** - This section actually consists of two major components; the Display and the Touchscreen. The Display is used to show the operator, via a graphical interface, the actual status of all compressor values. Warnings and shutdowns (and history/trending), pressure and temperature values, digital I/O status, setpoints, etc., are viewed on this display. The Touchscreen allows the operator to navigate and enter data directly via the display.

  Additional information about the Operator Interface can be found in Sections 2 and 7 of this manual.

CONTROL PANEL ENCLOSURE

The Frick® Quantum™ HD control panel enclosure utilizes available space efficiently and the small size allows it to be used on all of our compressor packages. The panel is also equipped with the necessary posts and hardware to add options in the field. They may also include a second analog and/or digital board, enclosure heater and air-circulating fan.

Dimensions of the HD panel are 24 x 22 x 11 inches (WxHxD) and weighs approximately 75 pounds with all options. Typically the panel will be mounted on the package, but it is also designed for easy wall mounting as well. Refer to the Quantum™ HD Control Panel Assembly drawing 649D5922 that appears later in this manual for the layout of this enclosure.

The DC power/communications harness in this panel is color-coded. This will make wire identification much easier. The coding is as follows:

- +5VDC - RED
- +12VDC - YELLOW
- +24VDC - GREY
- Common/Ground - BLACK
- +RX/TX - WHITE w/RED stripe
- -RX/TX - WHITE w/BLACK stripe

GENERAL INFORMATION

NOTICE

The components within the control panel can be inadvertently damaged by static electricity or mishandling. Only qualified technicians should directly handle these components.

1. **DO NOT** attempt to make corrections to the power supply without shutting off the power to the control panel. Accidental shorts can irreparably damage the processor boards or the display screen.
2. **DO NOT HANDLE** the panel boards without first attaching a properly grounded wrist ground strap to prevent static electrical discharge from your body.

Most problems encountered with the microprocessor and control circuits will be the result of a wiring fault, a blown fuse, faulty I/O module or failure of a peripheral control such as a solenoid coil or a pressure transducer. Faults in the computer, while possible, are unlikely. If a fault develops in the computer, the probability is that all functions will cease and the display screen will go blank. The control system of the compressor consists of an AC side, which can be either 120 volts, or 230 volts, and a DC side. The AC side actuates solenoids, relays, alarms, and other electromechanical functions. The DC side operates the computer and its various sensors.

⚠ WARNING

When working within the panel, the AC side, which can be either nominal 120 VAC or nominal 230 VAC, CAN CAUSE INJURY OR DEATH.

1. To troubleshoot the DC side of the control circuits, it will be necessary to have at least the following tools:
2. Accurate digital multimeter (capable of reading to DC/AC, mA to the hundreds place)
3. Small wire stripper
4. Small screwdriver (with insulated shaft)
5. Small snip nose pliers

NOTICE

Proper panel voltage refers to the AC that has been supplied to the panel, which could be either nominal 120 VAC or nominal 230 VAC (Reference the Control Panel Power Specifications).

NOTICE

When working with and around the various circuit boards inside the control panel, it is recommended to prevent static build-up and discharge to these boards by keeping yourself properly grounded. This can be accomplished by the utilization of the following items:

1. Wrist Grounding strap
2. Static free grounded work surface

WHAT TO DO BEFORE CALLING THE FACTORY

On occasions when a suspected Quantum™ HD problem is called in to a service representative, not enough information is provided for the service personnel to assist in solving the problem. This is most likely because the caller is not aware of the type of information that would be useful to service personnel in helping to identify and correct the problem. An example of this is the statement that the Quantum™ HD is not booting (the main processor board is not starting). Unfortunately, this description is usually vague and only means that there is nothing on the display. A blank screen could be the result of something else. The following is a list of possible reasons for no display:

- No power
- Loose or Faulty Display Cable or Inverter Cable
- Defective Display
- Wrong Combination of Display, Cable, or Software
- Faulty Q5 Processor Board

Before calling your Frick factor service representative for assistance, you may choose to review the information on the following pages to discover and resolve your issue. The actual cause of most problems will not be with the Q5 Processor Board itself, but with something external. However, on the rare occasion that the problem has been identified as being the Q5 Processor Board, use Section 3 as a guideline for replacing it.

When calling your Frick Factor service representative for assistance, include the Frick Sales Order number and the current Quantum HD software version that is installed in the control panel.

NOTES

SECTION 2

QUANTUM™ HD OPERATOR INTERFACE

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QUANTUM™ HD OPERATOR INTERFACE

DESCRIPTION

The Quantum™ HD Operator Interface consists of two components: A color 15" (diagonally measured) graphic display and a resistive touchscreen and a membrane touch overlay. The display is used to view information coming from the Q5 Processor Board controller, while the touchscreen allows the operator to navigate the menus.

DISPLAY ASSEMBLY

The Display assembly consists of a 1024 x 768 resolution LCD screen (which includes LED backlight sticks, and a wiring harness). Refer to the Parts List at the end of this manual for specific replacement part numbers.

NOTICE

Before replacing a display unit, ensure that the symptom is not actually being caused by a bad backlight LED stick, harness or jumper setting.

DISPLAY REPLACEMENT

1. Shut off control power.
2. Carefully unplug the touchscreen connector from the Q5 Processor Board. Ensure that you are familiar with the relocation of each of this connector.
3. Remove the six nuts that mount the display plate to the door.
4. Carefully lay the display plate down on a table or bench, with the display side up.
5. Loosen the four screws located on the display plate as shown in detail A that follows.
6. Once all four screws have been loosened, carefully slide the display out of the slotted mounting holes.
7. Remove the four screws and washers located at the sides of the display.
8. Reinstall the new display by reversing steps 7 and 6, in that order. Use the tool marks left by the hardware to position the new display.
9. Reinstall the display plate back into position on the panel door, and loosely reinstall the six hex nuts, do not tighten yet.
10. Carefully reconnect the display and backlight connectors on the back of the display.
11. Look at the display from the front of the panel door. Ensure that the display is centered in the display opening. Once centered, tighten the six nuts. Re-centering the display may be necessary after these steps have been completed.
12. Verify the Q5 Processor Board Display jumper settings per the table shown at the bottom of this page.

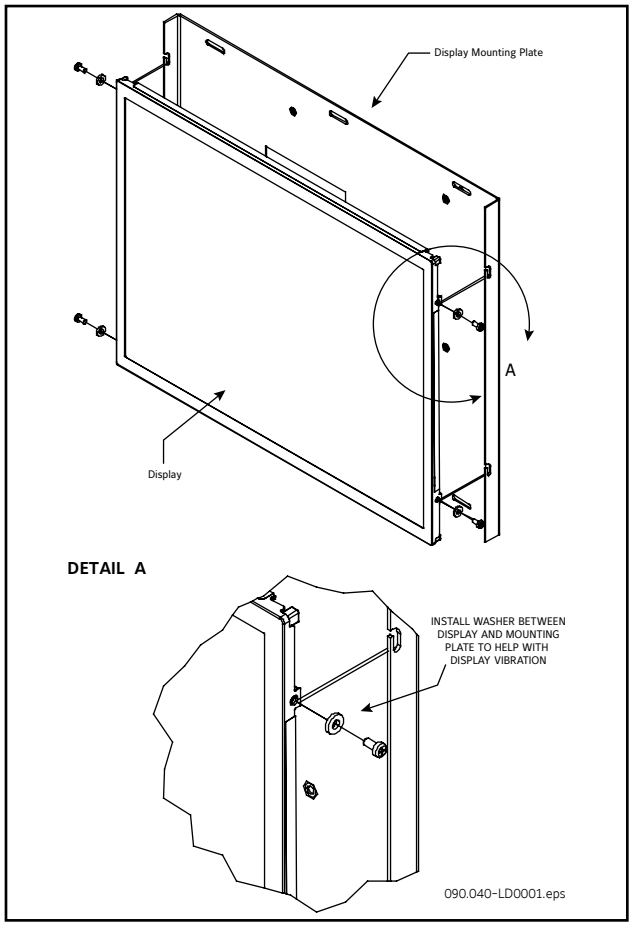
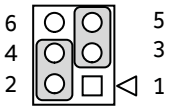
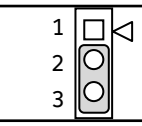
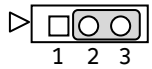


Figure 1. LCD Display Assembly & Mounting

Table 1. Q5 Processor Board Display Jumpers

Jumper Title	Function	Jumper Setting	
CN1000 (LCD Resolution Selector)	18-bit 1024x768 (default)		3-5 Closed & 2-4 Closed
JLVDS2 (Backlight Level Selector)	0– 5V (default)		2-3 Closed
JLVDS3 (Backlight Control Mode)	PWM Mode (default)		2-3 Closed

(Refer to Section 5 for location of jumpers)

TOUCHSCREEN DESCRIPTION

The Quantum™ HD utilizes an 8-wire resistive touchscreen interface to facilitate operator interaction. It consists of a transparent sheet of glass, which covers the entire display area, and has numerous rows and columns of micro wires embedded into its surface. Touching anywhere on the glass will cause an adjacent row and column of these micro wires to sense the pressure, and signals the control electronics that a connection has occurred, and converts the signal to a cursor location. The action is very similar to the way a computer mouse would be utilized, in that manipulating a mouse moves a cursor around on the screen, but in the case of a touchscreen, a finger tip causes the cursor to move. The touchscreen allows the operator to simply touch active areas of the display for the purpose of changing setpoints, selecting menus, and accessing other operational features.

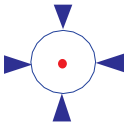
TOUCHSCREEN CALIBRATION

For the touchscreen to be used reliably, it must be accurately calibrated. The symptom of an improperly calibrated screen would be that an area of the screen that the user is touching is not being recognized, or an adjacent picture element is being activated instead of the intended one. It is also advisable to perform a calibration at unit commissioning.

There are two methods that may be used to access the Calibration feature:

1. As the Quantum™ HD is powering up, a prompt will appear for 5 seconds, allowing access to the Screen Calibration feature.
2. After the Quantum™ HD has been booted, the Screen Calibration feautre may be accessed by logging into the service level, then press **[Menu]**. Once the Menu appears, press **[Service]**. After the Service screen appears, locate the tab that is labled **[Calibrate Touch Screen]** and select it.

The display screen will be replaced with an all white screen. The upper left hand corner of the screen will show a red dot inside of an animated blue circle with arrows pointing to the center, as shown here:



The blue circle repeatedly shrinks and grows, to call attention to the red dot inside. Press as close as possible to the red dot. After the touchscreen has detected the depression, the animated circle will move to its next calibration point. Simply follow the circle, depressing at the red dot in each new location that it moves to. There will be a total of sixteen calibration points that will need defined. Upon successfully defining each point, the screen will return to the home screen. Screen calibration is complete.

USING AN EXTERNAL USB STYLE KEYBOARD OR MOUSE

NOTICE

Always be aware of the presence of live AC voltage within the control enclosure!

TO USE A USB COMPATIBLE COMPUTER KEYBOARD:

Open the control panel door, then use the following instructions:

Locate the two USB connections on the Q5 Processor Board, and plug the USB end of the keyboard cable into either one.

The external USB based keyboard is now active and ready to use. To navigate using the external USB style keyboard using keyboard mapping, refer to the following chart for special functions:

Table 2. Keyboard Mapping

Keyboard Key	Function
F2	Screen Calibration
F3	Stop Load
F4	Stop Unload
F5	Home
F7	Load
F8	Start Compressor
F9	Unload
F11	Alarm Silence
F12	Stop Compressor

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TO USE A USB COMPATIBLE COMPUTER MOUSE:

If using a mouse, note that by moving it, the on-screen cursor will track it's movement. Simply navigate the cursor using the mouse to simulate a finger tip. Click on the screen areas that you wish to access by pressing the left hand mouse button. Use the on-screen data and keyboard entry boxes that appear to enter values and text.

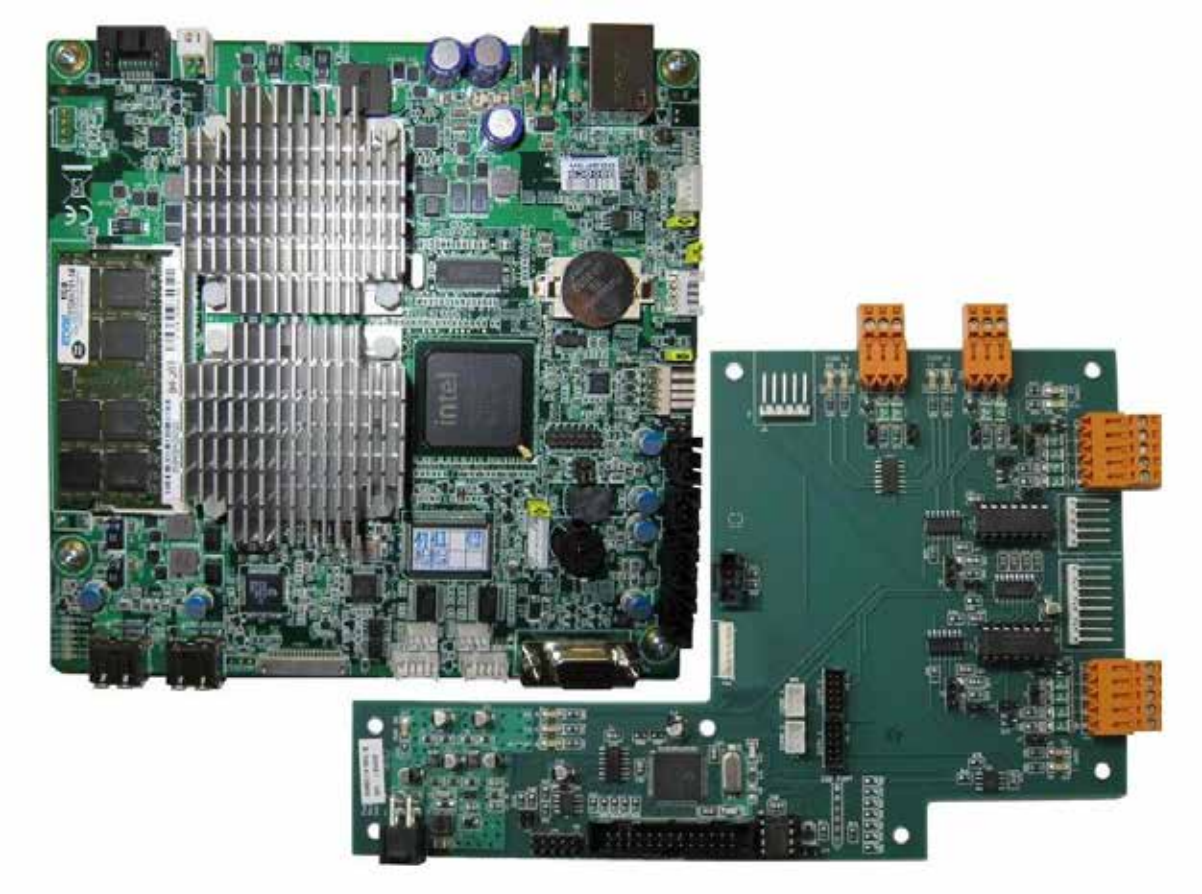
FOR QUANTUM™ HD PANELS WITH KEYPAD

When the Quantum™ HD was first introduced, and for several years afterward, the front panel Touchscreen overlay included a keypad below the display. The keypad portion of this overlay has been eliminated in current models. In the event that a new Touchscreen overlay would need to be ordered, a field replacement kit has been provided. The part number for this kit is 649D6101G01 (SAP #1032704). This kit comes with replacement instructions and spacers that allow the new ovelay to be aligned properly with the cutout opening in the panel door.

NOTES

SECTION 3

Q5 PROCESSOR BOARD & INTERFACE



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Q5 PROCESSOR BOARD

INTRODUCTION

Frick® Controls has released the latest version of the Quantum™ HD Control System. The micro-processor is the brains of the system and is referred to as the Q5 Processor Board. A photo of this board appears here:

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Figure 2. Q5 Processor Board Photo

FEATURES

The Q5 Processor Board includes the following features:

- 6 total USB ports (4 are dedicated, 2 are available)
- 10/100/1000 Mbps Ethernet Connection
- 2 RS-422 ports
- 2 RS-485 ports
- External Video monitor connection
- LED indicators to verify proper operation of various on board areas (power, communications, Ethernet connectivity, etc.)
- 2 GB RAM memory
- Battery to maintain date and time

WHAT SHOULD OCCUR WHEN APPLYING POWER

When powering up, the following sequence of events are indicative of a properly working main processor board:

- The six LED's in the lower left corner should turn on solid.
- The on-board "buzzer" should "beep" once.
- The display should show several DOS (text) style screens. A status bar will appear at the bottom of the screen and displays Fedora 15 as the boot sequence progresses.
- A Windows style screen with the letters HD will appear. The Operating Status (Home) screen will appear.
- A Loading bar will appear at the bottom of the screen, showing the percent of load that has completed, this is followed by additional DOS style text.

After the Q5 Processor Board has properly powered up, the following sequence of events is indicative of proper communication to the analog and digital boards:

- The Analog and Digital I/O boards TX/RX lights should be blinking.
- Each I/O board should have the power LED lighted and the Active LED should be blinking.
- The first thing that should be checked when troubleshooting the Q5 Processor Board is its powering up sequence.

WHAT IF THE OPERATING STATUS SCREEN IS NOT SHOWN

If the Operating Status screen is not shown, check the following items:

1. If no LED's are lit, then check AC and DC power. Refer to the Power Supply section.
2. Check if the lighting of the LED's is occurring as described in the What Should Occur When Applying Powering section.
   - If the powering up sequence continues to repeat without displaying the Operating Status screen, then there is a booting problem.
3. Check all plugged connectors for proper seating.
4. Check if an error message is displayed when booting.
   - Be sure to write down any error messages exactly as they appear, as well as the top line on the screen where the message appears.
5. Check that the software is OK:
   - Is the correct software installed?
   - Did you just install new software?
6. Check the display. If the Q5 Processor Board is booting but you have no display, check the following:
   - Check the LED backlight sticks. Look very closely at the display to see if anything is visible on the screen. If only a portion looks darkened, it may be that one of the backlights has failed. If the entire screen is dark (and it is not is sleep mode), use a beam type source of good lighting, such as a flashlight, look for any ghost type image. If it appears that there is something on the screen but very dark, the problem may be with either the backlight harness, the display or the Q5 Processor Board. Check to ensure that both ends of the backlight harness is plugged in securely. There is a sticker on the display mounting plate, that will have a part number that describes the type of display.
   - Verify that both the display cable and the backlight cable are firmly seated. It may be necessary to remove

the video cable from the back of the LCD display and re-seat it to be sure it is connected properly.

⚠ WARNING

This is a small connector. Caution should be observed so that it is not damaged due to excessive force.

- Refer to the Operator Interface section and check that the LCD, LCD cable, and software versions are matched correctly.

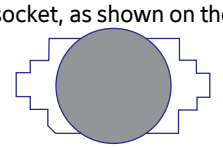
BATTERY FUNCTION AND REPLACEMENT

The Q5 Processor Board utilizes a battery to maintain correct date and time for the purpose of stamping warnings and shutdowns with the date and time that they occurred. If the date and time are not being maintained properly, this may indicate that the battery is not functioning, and should be replaced. The battery may be ordered through Baltimore Parts (P/N 333Q0001786) or may be purchased at most electronic shops (manufacturers P/N CR-2032).

The battery is fully assessable, but is surrounded by sensitive electronic components, so care should be taken when changing.

To replace the battery, ensure that the Control Power switch has been turned OFF.

Locate the Battery socket, as shown on the following drawing:



Once a static wrist band is properly donned, place your fingernail under the edge of the battery, and gently lift up. The battery should release itself from the socket easily. Take a new battery and place it into the holder in the same orientation as the old battery (the side with the writing must be facing out). Return the Control Power switch back to ON.

Once the Q5 Processor Board has rebooted, the correct Date and Time must be set.

INTERFACE BOARD DESCRIPTION

An interface board has been developed by Frick controls allowing the user to interface external serial communications connections to the Q5 Processor Board.

These connections consist of:

- Comm 1 (RS-422/485)
- Comm 2 (RS-422/485)
- Comm 3 (RS-485)

A photo of this interface board is shown here:

Figure 3. Interface Board Photo

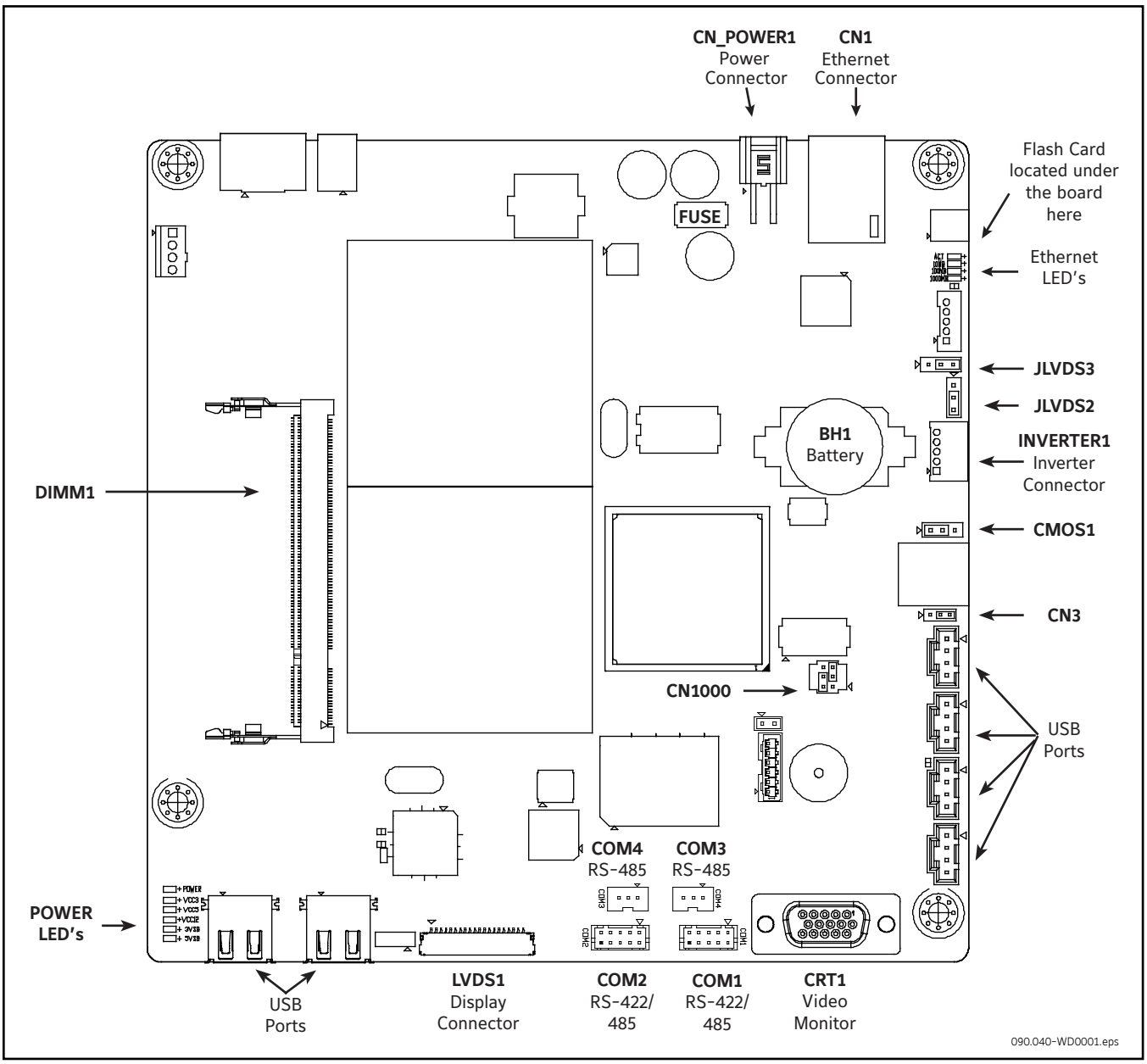


Figure 4. Q5 Processor Board Diagram

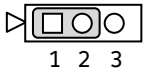
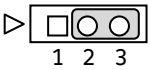
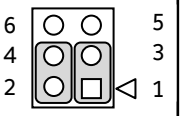
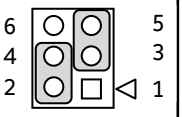
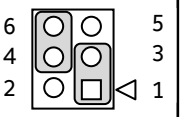
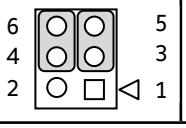
NOTE 1: The triangle symbol (▷) denotes Pin 1 on connectors. Refer to the chart on the following page for jumper settings.

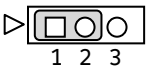
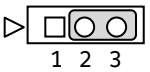
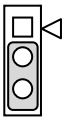
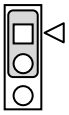
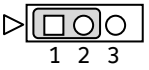
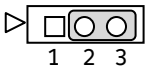
NOTE 2: Do NOT remove the CN4 jumper. Removal of this jumper will cause the processor to not power up.

NOTE 3: Although the Q5 Processor Board is the main controller, most of customer connections will be to the Interface board, as shown later.

Q5 PROCESSOR BOARD JUMPERS, LED'S AND CONNECTORS

Table 3. Q5 Board Jumper Settings

JUMPER TITLE	FUNCTION	JUMPER SETTING	
CMOS1 (CMOS Clear)	Normal (default)		1 - 2 Closed
	Clear CMOS		2 - 3 Closed
CN1000 (LCD Resolution Selector)	24-bit 800x600		1-3 Closed & 2-4 Closed
	24-bit 1024x768 (default)		3-5 Closed & 2-4 Closed
	18-bit 800x600		1-3 Closed & 4-6 Closed
	18-bit 640x480		3-5 Closed & 4-6 Closed

JUMPER TITLE	FUNCTION	JUMPER SETTING	
CN3 (Touch Panel Type Selector)	5-Wire Touch Screen		1-2 Closed
	8-Wire Touch Screen **(default)**		2-3 Closed
JLVDS2 (Backlight Level Selector)	0– 5V **(default)**		2-3 Closed
	0 – 2.5V		1-2 Closed
JLVDS3 (Backlight Control Mode)	Voltage Mode		1-2 Closed
	PWM Mode (Pulse Width Modulation) **(default)**		2-3 Closed

NOTE 1: The triangle symbol (▷) denotes Pin 1 on connectors.

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NOTE 2: Jumper CN4 is not shown on this chart, as it must always be installed.

Table 4. Q5 Board LED Definitions

LED Title	Label	Color	Function
Power LED's	LED1	Red	5VSB
	LED2	Red	3VSB
	LED3	Green	VCC 12V
	LED4	Green	VCC 5V
	LED5	Green	VCC 3V
	LED6	Blue	Power On OK Status
CN1000 (LCD Resolution Selector)	1000MB	Green	Giga – LAN Speed
	100MB	Yellow	100MB - LAN Speed
	10MB	Red	10MB –LAN Speed
	ACT	Green (Blinks)	LINK Activity

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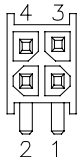
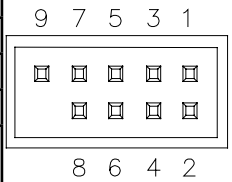
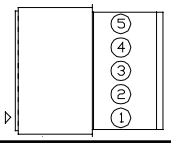
Table 5. Q5 Board Connector Pinouts

Connector Title	Pin	Function	
CN_PWR1 (Power Input)	1	Ground (GND)	
	2	Ground (GND)	
	3	VCC 12V	
	4	VCC 5V	
COM1 & COM2 (RS-422 Communica-tions)	1	-RX	
	2	+RX	
	3	-TX	
	4	+TX	
	5	Ground (GND)	
COM3 & COM4 (RS-485 Communica-tions)	1	-RX/TX	
	2	+RX/TX	
	3	Ground (GND)	

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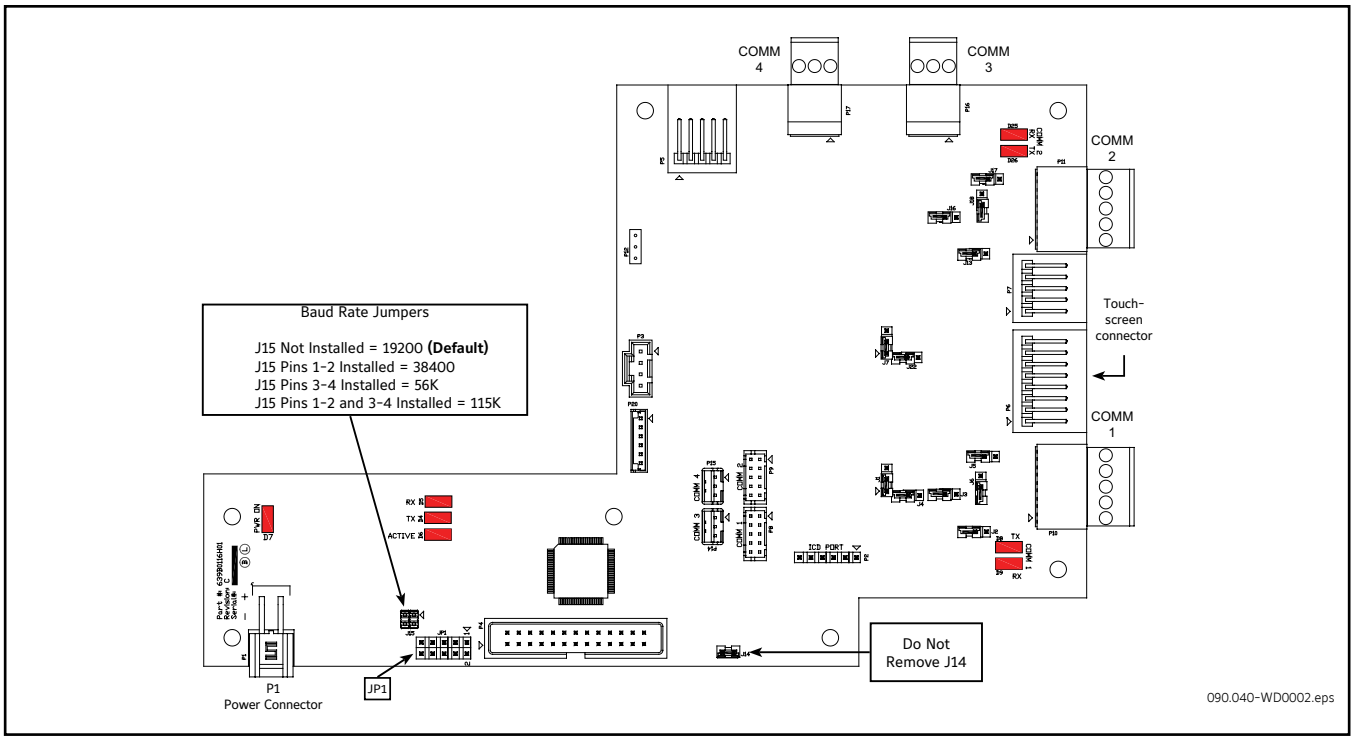

Figure 5. Interface Board Diagram

Table 6. JP1 System Settings

Jumper JP1	Function	Jumper Setting	
1 - 2	Not Used		Not Installed
3 - 4	Reformat E2Prom		Installed
5 - 6	Erase Setpoints (at boot-up)		Installed
7 - 8	Not Used		Not Installed
9 - 10	Disable Watchdog		Installed

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Table 7. Comms 1 & 2 Jumper Settings

(Comms 3 and 4 have no jumpers)

Comm 1	Comm 2	Function	Jumper Setting	
J1	J7	RS-422 (4-Wire) **Default**	3 2 1	1 - 2 Closed
		RS-485 (2-Wire)	3 2 1	2 - 3 Closed
J2	J13	Pull Down **Default**		1 Pin Only
J3	J16	Pull Up **Default**		1 Pin Only
J5	J17	RS-422 **Default**		1 Pin Only
		RS-485		1 - 2 Closed
J6	J18	RS-422 **Default**		1 Pin Only
		RS-485		1 - 2 Closed
J4	J22	High Speed Target **Default**		1 - 2 Closed

NOTE: The triangle symbol (◁) denotes Pin 1 on connectors.

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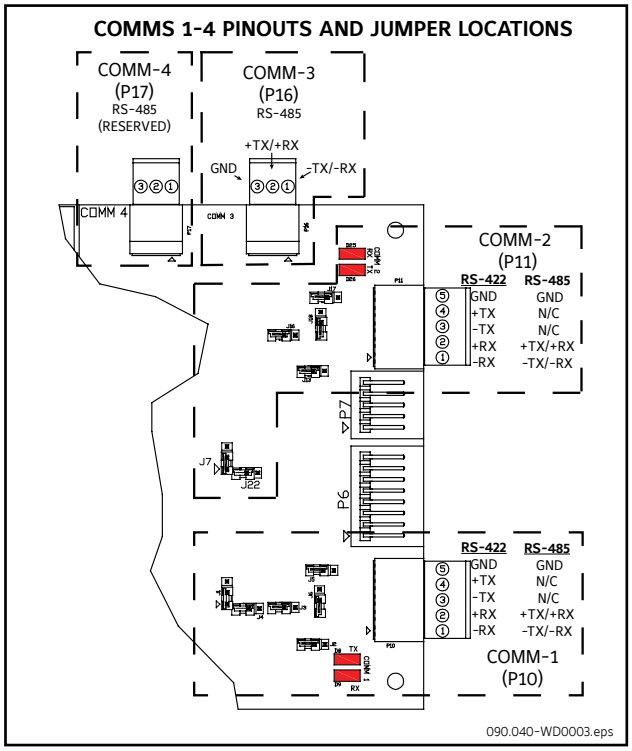


Figure 6. Pinouts and Jumper Locations

The pictorial below depicts the Q5 Processor Board, and the necessary interconnects between it and the Interface board. Each of the interconnecting harnesses must be installed as shown for proper operation.

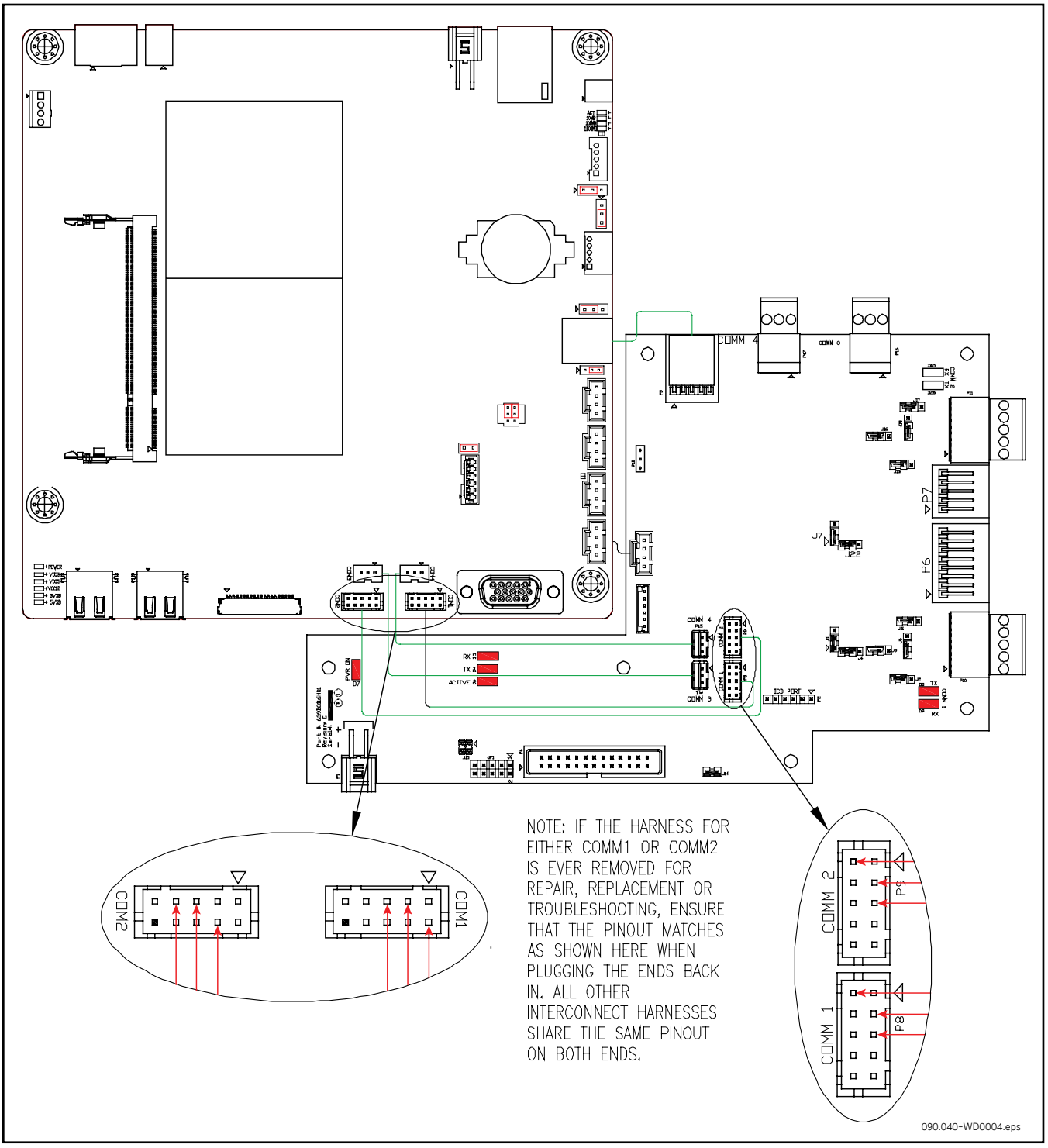

COMM 4
COMM 3
P7
P6
J7
J22
COM2
COM1
NOTE: IF THE HARNESS FOR EITHER COMM1 OR COMM2 IS EVER REMOVED FOR REPAIR, REPLACEMENT OR TROUBLESHOOTING, ENSURE THAT THE PINOUT MATCHES AS SHOWN HERE WHEN PLUGGING THE ENDS BACK IN. ALL OTHER INTERCONNECT HARNESSES SHARE THE SAME PINOUT ON BOTH ENDS.
COMM 2
P9
COMM 1
P8
090.040-WD0004.eps

Figure 7. Q5 Processor Board Interconnections

The following pictorial shows the locations of the Q5 Processor Board and the Interface board and how they mount to the back of the display plate.

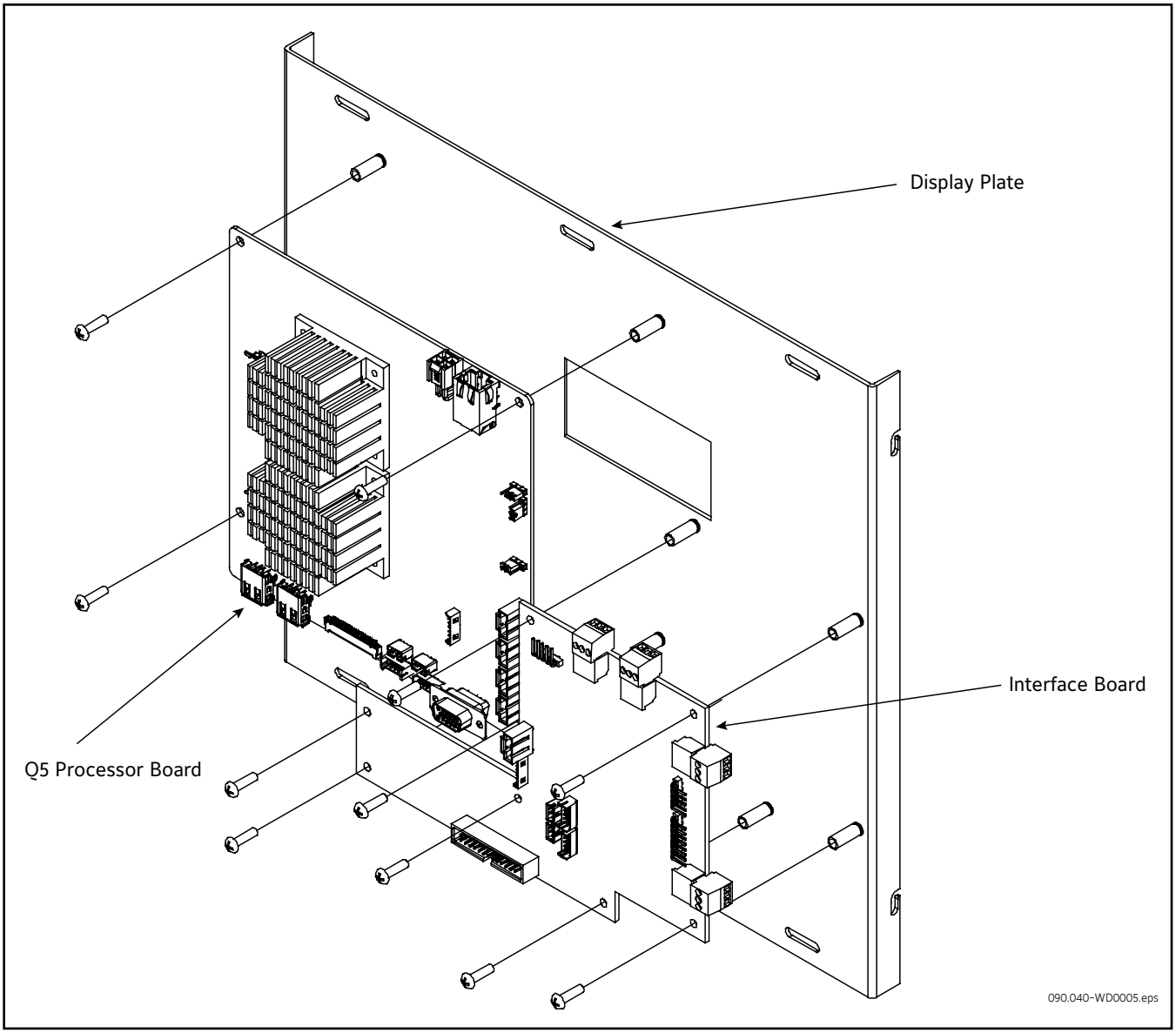
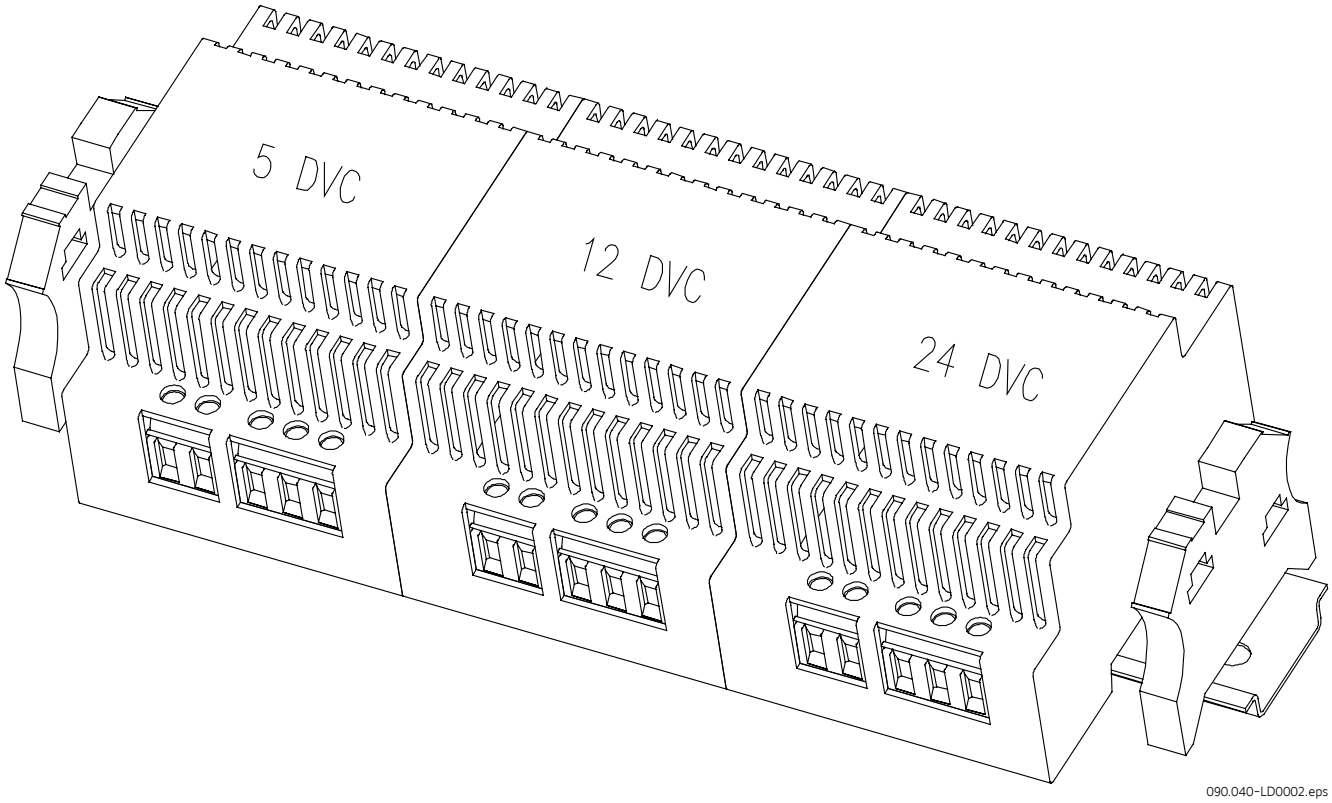


Figure 8. Q5 Processor Board Mounting

SECTION 4

POWER SUPPLY



090.040-LD0002.eps

POWER SUPPLY

DESCRIPTION

The power supply of the HD control panel consists of three independent supplies, and are located on the inside of the front door below the Interface board. They supply the following DC voltages:

- +5 VDC Output 5A / 25W
- +12 VDC Output 4A / 48W
- +24 VDC Output 2A / 48W

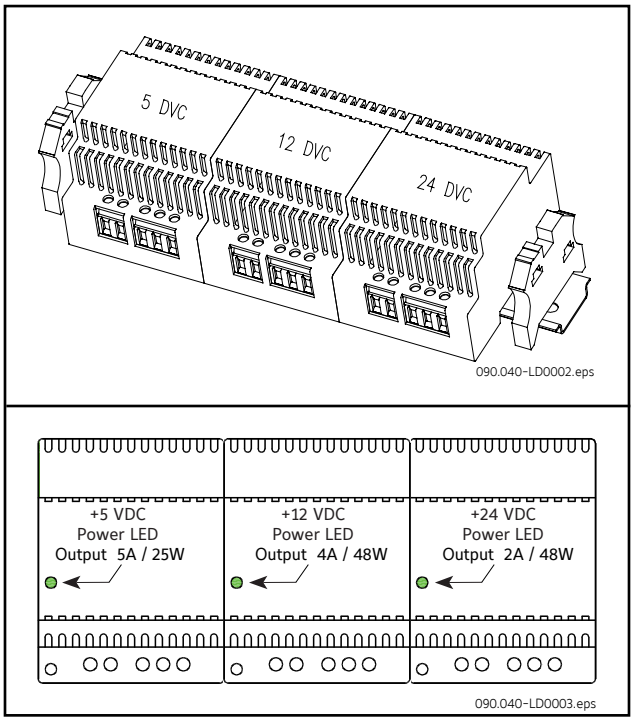


Figure 9. Power Supplies

All three supplies are adjustable and each has a green LED indicator to show that they are powered. Refer to the following page for the location for the adjustment.

POWER DISTRIBUTION

DC power from the power supplies is wired directly to a series of terminal blocks. The terminals for these voltages are labeled as follows:

- Common (1000)
- +24 VDC (1004)
- +5 VDC (1001)
- +12 VDC (1002)

+12 VDC power is then distributed to the Q5 Processor Board, Interface Board. +5 VDC is for the Digital board(s), and +24 VDC is for external as needed control.

+24 VDC is used to power the 614 analog boards and other external devices. Total load on this supply cannot exceed 2A / 48W.

+12 VDC is used to power the display, processor and interface boards. Total load on this supply cannot exceed 4A / 48W.

+5 VDC is used to power the digital boards. Total load on the supply cannot exceed 5A / 25W.

MEASURING VOLTAGES

⚠ CAUTION

Measuring and adjusting the power supply voltages require the control power switch to be energized. Extreme care must be observed when taking any readings, as 120 or 230 VAC (depending on incoming system voltage) will be present next to the DC voltage connector. Adjusting the supplies requires the use of a small insulated Philips screwdriver inserted into the supply to access an adjusting potentiometer.

⚠ CAUTION

It is possible for the screwdriver (and the person making the adjustment) to come into contact with potentially lethal voltages. Proper Personal Protective Equipment (PPE) measures need to be observed.

All circuit boards within the Quantum HD control panel require accurately adjusted DC voltages to function properly. Periodic measurement and adjustment of the DC power system is recommended for optimum system operation. Over time, it is possible for temperature, humidity, vibration and component age, to degrade the accuracy of these voltages. When any of the DC voltages begin to stray from their optimum range, mysterious problems can begin to arise.

Even with a perfectly adjusted supply, it is possible for a potential drop in voltage at each connection point. This drop normally is in the millivolt range, but under some conditions, the drop can be much greater (as high as tenths of a volt). By the time the voltage reaches the last board in the daisy chain, and all of these potential voltage drops are considered, the combined drop can be such that problems can be apparent. Some examples of problems could be:

- Loss of or intermittent communications failures.
- A shutdown message stating Digital Board x Reset (where "x" is replaced by the number of the Digital Board that failed).
- An shutdown message stating Analog Board x Comm. Fail - Shutdown (where "x" is replaced by the number of the Analog Board that failed).
- Numerous sensor fault shutdown messages.
- Q5 Processor Board reboots for no apparent reason.
- Improper readings of analog pressures and temperatures.
- LED's on the Q5 Processor Board are lit, but nothing appears on the display.

To perform measurements and adjustments on the power supply voltages, use a reliable, calibrated Digital Volt Meter (DVM). The DVM should be accurate to 1/100 of a volt DC. With the control power switch turned ON, wait until the Operating Screen appears. This is because the graphics required to create this screen will draw more current than when the screen is not fully booted. If the screen never appears however (possibly due to a voltage problem), you will need to proceed regardless of what is or is not displayed.

In order to properly measure the DC power system, it must be checked at the DC power terminal strip.

Ensure that the meter is set to the proper range (DC, 0-50 V or equivalent), as well as observing proper wire polarity. The acceptable range for each supply is as follows:

- 5 Volt Supply (+5.10 to +5.20 Vdc)
- 12 Volt Supply (+12.10 to +12.20 Vdc)
- 24 Volt Supply (+24.2 to +24.50 Vdc)

ADJUSTMENT

If any of the voltages shown above are out of the acceptable range(s) shown, adjustment is required. Locate which of the supplies require adjustment. The adjustment access hole for each supply is located on the lower left of the front of the supplies. If an adjustment is required, use a small insulated Philips screwdriver, insert the tip into the access hole for the appropriate voltage potentiometer (refer to the following diagram for adjustment location).

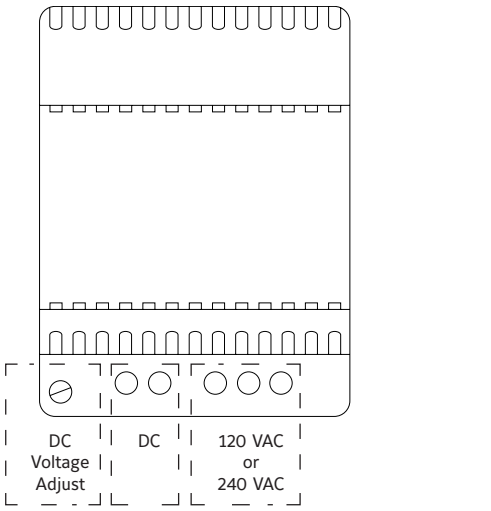


Figure 10. Power Supply Adjustment

NOTICE

Extreme care must be used when adjusting the potentiometer. Adjustment should only be performed by qualified personnel. The use of a non-conductive device is recommended.

+5 VDC ADJUSTMENT

Locate the DC power terminal strip. Terminal 1001 is the +5 VDC, and 1000 is common (COM).Place the negative lead on 1000, and the positive lead on 1001. Verify that the DVM is displaying in the range of +5.10 to +5.20.

If adjustment is required, locate the adjustment access hole on the +5 VDC supply, as previously shown. While watching the DVM, slowly rotate the screwdriver blade clockwise to increase the voltage or counter-clockwise to decrease until the voltage is correctly adjusted.

+12 VDC ADJUSTMENT

Locate the DC power terminal strip. Terminal 1002 is the +12 VDC, and 1000 is common (COM). Place the negative lead on 1000, and the positive lead on 1002. Verify that the DVM is displaying in the range of +12.10 to +12.20.

If adjustment is required, locate the adjustment access hole on the +12 VDC supply, as previously shown. While watching the DVM, slowly rotate the screwdriver blade clockwise to increase the voltage or counter-clockwise to decrease until the voltage is correctly adjusted.

+24 VDC ADJUSTMENT

Locate the DC power terminal strip. Terminal 1004 is the +24 VDC, and 1000 is common (COM). Place the negative lead on 1000, and the positive lead on 1004. Verify that the DVM is displaying in the range of +24.20 to +24.50.

If adjustment is required, locate the adjustment access hole on the +24 VDC supply, as previously shown. While watching the DVM, slowly rotate the screwdriver blade clockwise to increase the voltage or counter-clockwise to decrease until the voltage is correctly adjusted.

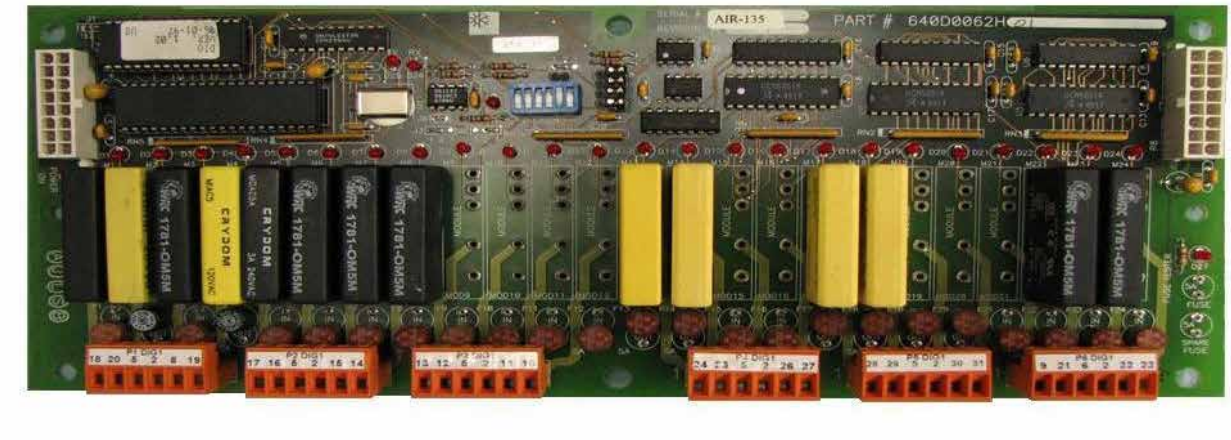
POWER SUPPLY REPLACEMENT

If any of the power supplies are found to be bad, or not capable of acceptable adjustment, the failing supply will need replacing. Refer to the Recommended Spare Parts list for the appropriate part number.

NOTES

SECTION 5

DIGITAL BOARD



DIGITAL BOARD

INFORMATION

The information that follows in this section can help locate problems that can occur with Digital Input and Output circuit boards.

DIGITAL BOARD DESCRIPTION

The Digital board is a small microprocessor board and is programmed to control discrete outputs, or accept discrete inputs, from external electrical devices. Each Digital board has the capability of 24 independent channels or I/O (Input/Output). Each channel that is used needs a module plugged into it. A yellow module indicates that it is used for Inputs. A black module is used for Outputs. The standard Quantum™ HD compressor control can have up to two Digital boards (depending on options).

COMMUNICATIONS LED'S

The Q5 Processor Board is in constant communication with all Digital (and Analog) Boards. You will notice on each Digital and Analog board, there are a pair of LED's labeled as RX and TX. These letters represent Receive (RX) and Transmit (TX). These LED's should be flashing at a high rate during normal operation. This indicates that the Q5 Processor Board, and the Digital board are properly communicating with each other.

- Reference the JUMPER AND DIPSWITCH SETTINGS section later in this manual. This section contains the dipswitch settings for addressing the Digital I/O boards. When these switches are properly set, the main board is able to serially communicate with each I/O board and provide control signals and data exchange. If these switches are not properly set, the result will be lost or failed communications, or the wrong outputs being energized, or the wrong inputs being received.

CONNECTIONS TO THE QUANTUM™ HD

As stated earlier, the Quantum™ HD standard compressor control system utilizes up to two Digital, and two Analog boards. To connect these boards together so that the Quantum™ HD can control them, they must be connected with a wiring harness that provides all of the necessary D.C. voltage requirements, as well as the communications capabilities.

The Digital boards only require the +5 Vdc voltage and the Return (or common) for logic power. The communications signals (RX & TX) are required by all boards.

A harness distributes power and communications from the terminal blocks to the various logic boards. The harness splits into two branches, each ends with two 16 pin connectors. The branch that supplies power and communications to the Digital board(s) utilizes red and black wires for +5Vdc power and Common, and white/black and white/red wires for serial communications.

LOGIC VOLTAGE (POWER) LED

Located on the Digital Board is a Power LED. This LED will be illuminated as long as the Control Power switch is ON, and the proper voltage is present at the power supply. The power supply generates the +5 Vdc voltage and passes it on through the Power-I/O harness. This LED does not indicate however that the proper voltage is necessarily present at the board, only that the voltage is enough to energize the voltage sensing circuitry. If a voltage related problem is suspected with regard to a Digital Board, the only way to actually determine this is to read the voltage on a Digital Voltage Meter (DVM). This may be accomplished by locating the white power / communications connector on the board. Notice that the Digital Board has one of these connectors on both ends of the board. The associated power / communications harness will only be plugged into one of these connectors. Take the red (positive) probe of the DVM and carefully insert the end into the "+5V" lead, and the black (negative) probe end into the "RET" (Return or Common) lead, as shown below:

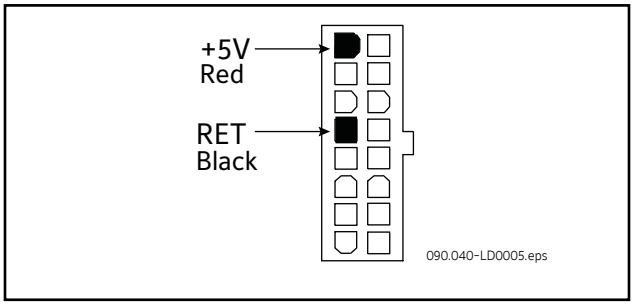


Figure 11. Return Lead

Set the DVM to read DC, and set the proper range. The voltage reading must read a minimum of +5.0 Vdc. The Power-I/O harness will have an associated voltage drop at each board connection. As an example, if you are reading 5.20 Vdc at the first I/O board in the daisy chain, the voltage at the subsequent connections for the remaining boards may be lower. The voltage will need to be corrected for proper operation of the system. The cause for a low voltage reading could be:

- The power supply may need adjustment (see the section on power supplies).
- The Power-I/O communications harness has a problem (a new harness may be needed).
- A problem may exist with one of the I/O boards (Digital or Analog).
- If the power LED is not lighted, check the cable for proper connectivity. Note: Each board provides the necessary connections to feed all signals to the following connectors. If the auxiliary Analog or Digital Board is not present then a jumper plug (see Recommended Spare Parts List) must be installed to daisy chain the signals.

The most common symptom that is exhibited by a low +5 Vdc voltage to the Digital Boards is an alarm message that reads Digital Board Reset Shutdown.

ACTIVE LED

The Digital Boards have an Active LED indicator on the board that blinks when the board's software is running.

If the Active LED is not blinking, check to ensure that the EPROM is installed properly. The EPROM is located in chip slot U8, next to the power connector.

DIGITAL INPUTS

A Digital Input is the portion of the hardware that allows devices such as limit switches, relay contacts, and level switches, to interface with the Quantum™ HD. The software program within the Quantum™ HD is constantly looking at these Input channels, via communications, and based upon whether a control voltage is present or not, will provide the necessary control for an associated Output channel. For instance, if a control voltage is present on the Oil Level Sensor input, the software will determine that the Separator has sufficient oil level for the oil heaters to be energized (if the temperature of the oil is also sensed to be low. Temperature sensing will be discussed in the Analog Input section).

There are two possible varieties of Digital Input modules used on standard compressor control packages. One is for 120 Volt controls, and the other is for 230 volt controls. Both of these module styles are yellow in color. A side profile of these modules is shown below:

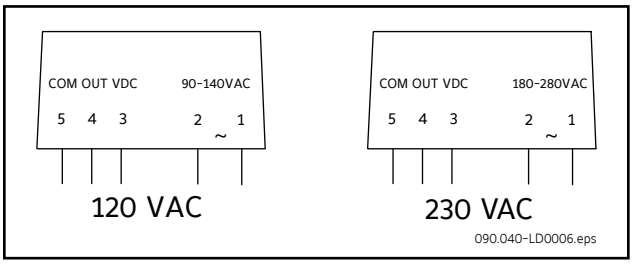


Figure 12. Digital Input Modules - Side View

These Input modules, can be identified as to their operating voltage by looking at either the side, as shown above, or from the top. You will notice the module operating voltage printed on the top, and the voltage range printed on the side.

Never plug a 120 Volt Input module into a 230 Volt system, and vice-versa. Never plug an Output module into a position designated for an Input module.

You will notice that when a module is plugged into the Digital board, there is a fuse located directly adjacent to the module. This fuse is of the pluggable variety, and must be plugged into the IN position for an Input module.

DIGITAL OUTPUTS

A Digital Output is the portion of the hardware that the Q5 Processor Board is to control (energize). These devices include solenoids, relay coils, and heaters to be energized, based upon the logic within the Quantum™ HD software program.

The Digital Output module used on standard compressor control packages will handle both 120 Volt controls, and 230 volt controls. This module is black in color. A side profile of this module is shown below:

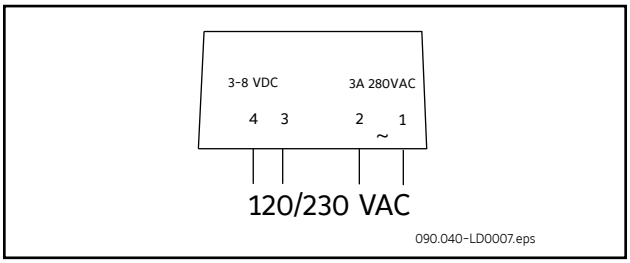


Figure 13. Digital Output Module - Side View

Although this Output module is labeled as 280 VAC on the top, and on the side, it can be used on both 120 and 230 volt applications.

Never plug an Input module into a position designated for an Output module.

You will notice that when a module is plugged into the Digital Board, there is a fuse located directly adjacent to the module. This fuse is of the pluggable variety, and must be plugged into the OUT position for an Output module.

CHECKING THE DIGITAL INPUTS AND OUTPUTS

Some problems that may be encountered involve troubleshooting the digital inputs and outputs. The Digital I/O (Input / Output) Boards have six Digital I/O (DIO) board connectors labeled P1 through P6. The Input and Output modules are wired to a DIO connector plug. Position 3 provides power and position 4 is a neutral on the DIO connectors. Positions 1, 2, 5, and 6 are signal connections, as shown below:

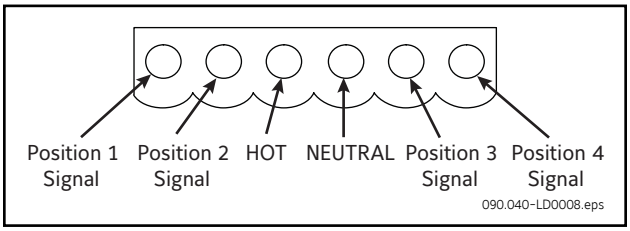


Figure 14. Signal Connections

The Digital board's I/O modules are configured by proper module selection, AC or DC, operating voltage, input or output, and moving the fuse to the in or out position. An LED is associated with each module and displays the state of each module. A lit LED represents an Input that is High, receiving a signal or an Output that is On.

If a properly configured Digital I/O is not responding correctly, first look at the Digital Board on the Service Screen and check if the module is on. If it is not on, check if the LED on the Digital Board is also not lit. If the LED is not lit, then check the fuse. If the fuse is OK, then check the module.

FUSE TESTING AND REPLACEMENT

1. Power off the panel.
2. Open the panel door.
3. Remove the questionable fuse.
4. Place the questionable fuse into the fuse tester at the one end of each Digital I/O Board (refer to the Digital Board drawings at the end of this section for exact fuse tester location).
5. Power on the panel.
6. Check the LED on the tester. If the LED is lit, the fuse is OK.
7. Power off the panel.
8. If the fuse is faulty, check for external shorts on the corresponding circuit, the replace the fuse with a new plug-type fuse (refer to Recommended Spare Parts list).

INPUT AND OUTPUT MODULE TESTING AND REPLACEMENT

1. Power off the panel.
2. Open the panel door.
3. Replace the questionable module.
4. Power on the panel.
5. If it is an Output module, check for proper panel voltage on the orange connector plug. Check the voltage between position 4 (neutral) and the associated position to the Output module.
6. If it is an Input module, check if the associated LED is on when power is applied to the module.

TROUBLESHOOTING AN OUTPUT

1. Make sure the LED associated with the Output is on when power is applied to the module.
2. If the LED is not on when it should be and there is no operating condition preventing it, contact your Frick® factor for service.
3. If the LED is on when it should be, check for proper panel voltage on the white connector plug. Check the voltage between the position 4 (neutral) and the associated position to the Output module.
4. If the voltage is OK, check for proper panel voltage between the associated position to the Output module on the orange connector and the associated position on the terminal strip.
5. If the voltage is OK, check the wiring external to the panel.
6. If voltage is not OK, check the fuse.
7. If the fuse is OK then check the module.
8. If the module is OK, check for proper panel voltage on the orange connector plug between position 3 (Hot) and position 4 (neutral).

TROUBLESHOOTING AN INPUT

1. Make sure the LED associated with the Input is on when power is applied to the module.
2. If the LED is on then the fuse and Input module are good.
3. If the LED is on and there is no input voltage, replace the Input module.
4. If the LED is not on when power is applied, check the fuse.
5. If the fuse is good, replace the Input module.
6. If you are receiving an Alarm or Shutdown from a digital input in which the adjacent LED indicator light is on, check the Service Screen to see if that channel is turning on and off. If so, replace the input module.

REPLACING A DEFECTIVE DIGITAL BOARD

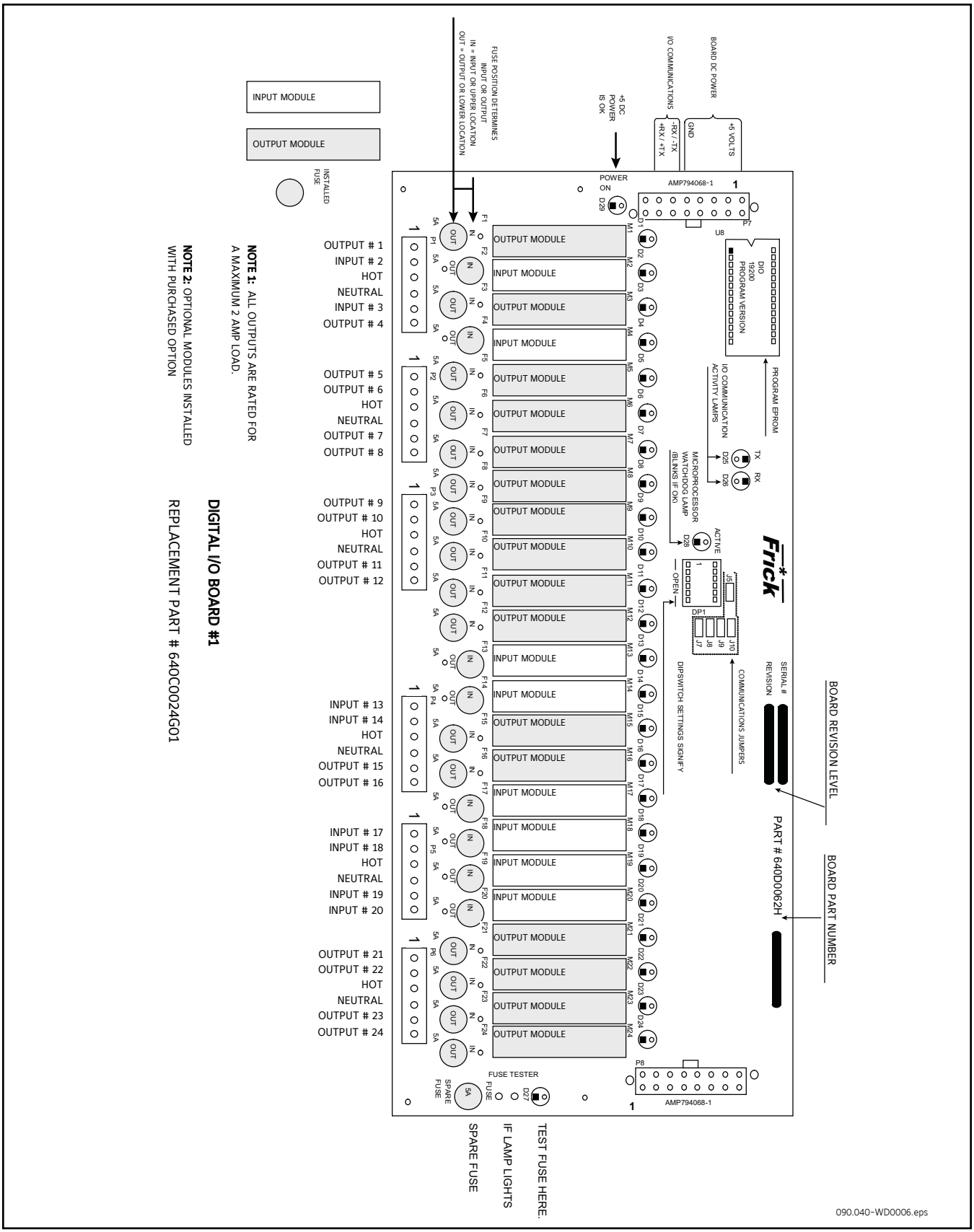
The procedure to replace a Digital board is outlined below.

NOTICE

Use an anti-static wrist band for this procedure.

1. Shut off control power.
2. Remove the old board from the panel.
3. Remove the new board from its packing and place both on an anti-static surface.
4. Check that all jumpers, dipswitches and components are properly setup on the new board as it was on the old board (refer to the Digital Settings tables near the end of this section).
5. Install the modified replacement board in the panel.

After replacing or installing a Digital Board and powering on the control panel, select **[Re-detect I/O Boards]** from the **Menu > Service > Communications** screen. This selection provides a method to detect all connected Digital and Analog boards. If a board has been removed, a communication error shutdown will be issued until this key is selected. The About screen will show what was detected.



NOTE 1: ALL OUTPUTS ARE RATED FOR A MAXIMUM 2 AMP LOAD.

NOTE 2: OPTIONAL MODULES INSTALLED WITH PURCHASED OPTION

DIGITAL I/O BOARD #1

REPLACEMENT PART # 640C0024G01

Figure 15. Digital I/O Board #1

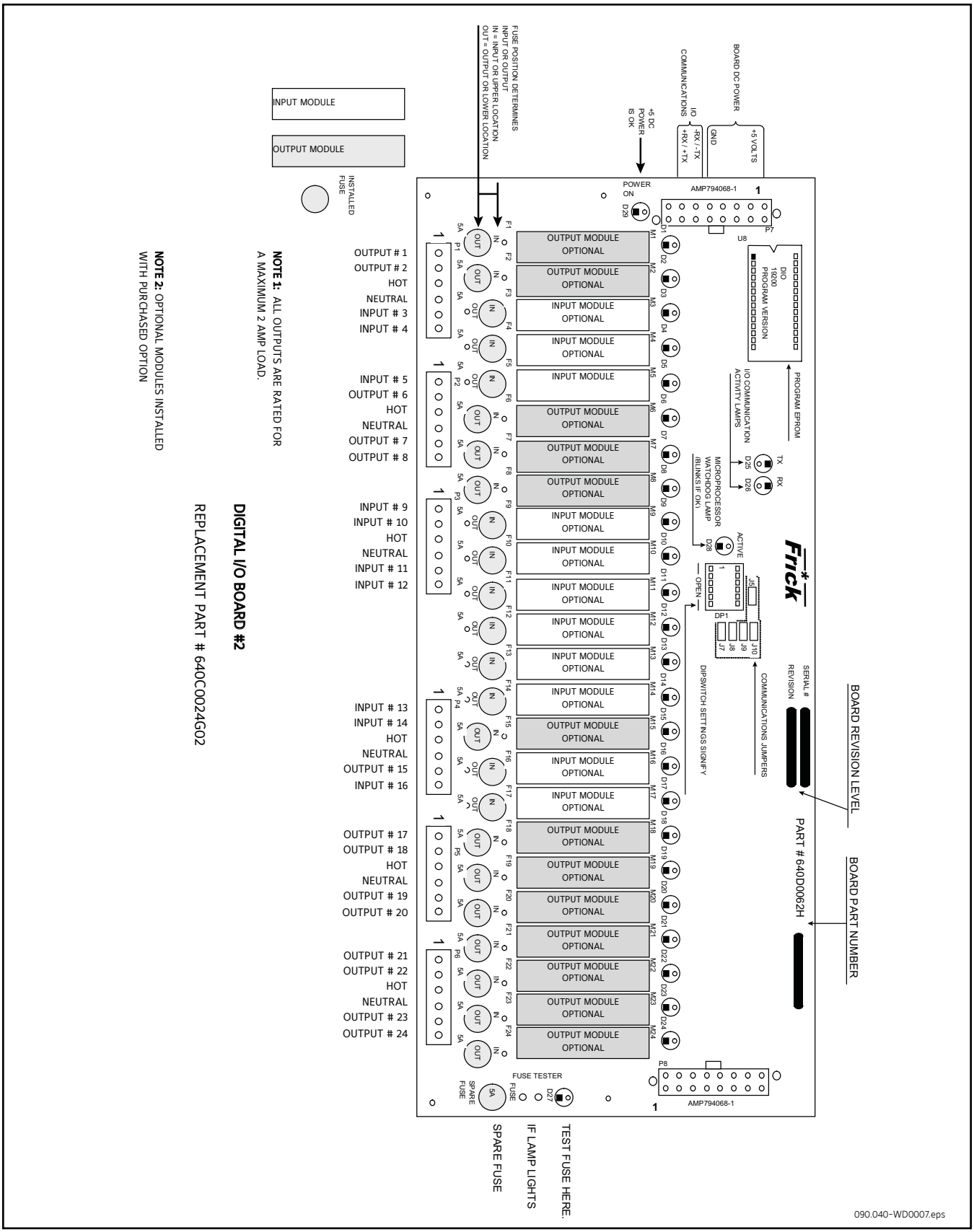


Figure 16. Digital I/O Board #2

DIGITAL BOARD SETTINGS

The following table is to be used when configuring the Quantum™ HD for external communications.

Table 8. Communication Settings

J5	in	120 ohm long communications line termination.
	out*	No termination.
J7	in	RS-422/485 transmit pull-up for long communications lines.
	out*	No pull-up.
J8	in	RS-422 transmit pull-up for long communications lines.
	out*	No pull-up.
J9	in	RS-422/485 receive pull-down for long communications lines.
	out*	No pull-down.
J10	in	RS-422 receive pull-down for long communications lines.
	out*	No pull-down.

* = standard setting

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The following table is to be used to set the digital board addresses. If there is only one board installed, it should be set as board #1, if there are two boards they each need to be set according to the wiring diagrams.

Table 9. Dipswitch Settings

	SW1	SW2	SW3	SW4	SW5	SW6
Board #1	on	on	on	on	off	on
Board #2	off	on	on	on	off	on

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NOTES

SECTION 6

614 ANALOG BOARD

ANALOG BOARD

OVERVIEW

The Frick Quantum™ HD control panel is capable of reading external analog devices, such as temperature probes and pressure sensors. It uses these input signals for the purpose of monitoring and control. As an example, if an external temperature sensor began to read a higher than expected temperature in some area, the controller would sense this change, and provide the necessary output control signal to remedy the situation. Unlike a digital signal, which is typically either an on or off state, an analog signal can assume a wide variety of states, such as a temperatures probe reading a wide range of temperatures.

The method used for receiving (and sending) these signals is the analog board. The analog devices are wired directly to the board, and the on-board software/hardware converts the electrical signals received from these devices into data, which is then sent on to the Q5 Processor Board via communications.

It features twenty-four input channels, and eight output channels. Rather than using physical jumpers to configure each channel, this is done through the software. A more detailed description of the operation of this board is provided in the sections that follow.

ANALOG BOARD DESCRIPTION

The Analog Board is actually a small microprocessor board and is programmed to control analog outputs, or accept analog inputs, from external electrical devices. Each board has the capability of 24 independent input channels. With the Quantum™ HD Compressor Control, these I/O channels are dedicated through the software and external wiring, as to the function of each channel. The Quantum™ HD 5 controller can utilize up to two separate analog boards (Analog Board #1 and #2), depending on the selected options.

For each of the boards that are installed, they will have specific I/O (Input / Output) functions. For the operating software to distinguish board #1 from #2, each board must be properly addressed as #1 and #2 using the dipswitches on each board (see Analog Board Dipswitch Settings chart for this information).

COMMUNICATIONS LED'S

The main board is in constant communication with all Analog (and Digital) Boards. You will notice on each Digital and Analog board, that there are a pair of LED's labeled as RX and TX. These letters represent Receive (RX) and Transmit (TX). These LED's should be flashing at a high rate during normal operation. This indicates that the main board, and the Digital board that you are looking at, are properly communicating with each other.

- Refer to the JUMPER AND DIPSWITCH SETTINGS section later in this section. This table contains the dipswitch settings for addressing the Analog I/O boards. When these switches are properly set, the main board is able to serially communicate with each I/O board and provide control signals and data exchange. If these switches are not properly set, the result will be lost or failed communications, or the wrong outputs being energized, or the wrong inputs being received.

CONNECTIONS TO THE QUANTUM™ HD

As stated earlier, the Quantum™ HD compressor control system utilizes up to two Digital, and two Analog boards. To connect these boards together so that the Quantum™ HD can control them, they must be interconnected with a wiring harness that provides all of the necessary D.C. voltage requirements, as well as the communications capabilities.

Analog boards only require the +24Vdc voltage and the Return (or common) for logic power. The communications signals (RX & TX) are required by all boards.

A harness distributes power and communications from the terminal blocks to the various logic boards. The harness splits into two branches, with each branch ending with a 16 pin connector. The branch that supplies power and communications to the Analog board(s) utilizes gray and black wires for +24Vdc power and Common, and white/black and white/red wires for serial communications.

LOGIC VOLTAGE (POWER) LED'S

Located on the Analog Board are two power LED's. The first of these is D65 PG LED (+24Vdc), and will be illuminated as long as the Control Power switch is ON, and the proper +24Vdc voltage is present at Analog Board connector P3. This LED does not indicate that the proper voltage is necessarily present at the board, only that the voltage is enough to energize the voltage sensing circuitry.

If a voltage related problem is suspected with regard to a Board, the best way to actually determine this is to read the voltage on a DVM (Digital Volt Meter). This may be accomplished by locating the white power / communications connector on the board. Notice that the Analog Board has only one of these connectors. The associated power/communications harness plugs in to it. Take the red (positive) probe of the DVM and carefully insert the end into the +24Vdc lead, and the black (negative) probe end into the RET (Return or Common) lead, as shown below:

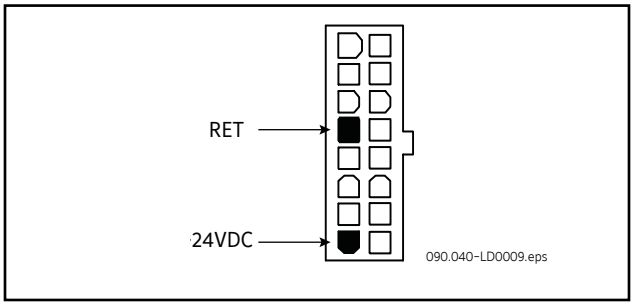

Figure 17. Return Lead

Set the DVM to read DC, and set the proper range. The Ideal voltage setting for the +24Vdc power is 24.2 - 24.5Vdc.

The cause for a low voltage reading could be:

- The power supply may need adjustment (see the section on power supplies).
- The Power-I/O communications harness has a problem (a new harness may be needed).

- A problem may exist with one of the I/O boards (Digital or Analog).
- If the power LED is not lighted, check the cable for proper connectivity.

ACTIVE LED

The Analog Board has an Active LED indicator that blinks when the board's software is running.

If the Active LED is not blinking, it could be an indication that the internal program is not running. Try powering the Q5 Processor Board off, then back on to see if the Active light starts blinking. If not, a new board may be required.

ANALOG INPUTS

An Analog Input is the portion of the hardware that allows devices such as temperature sensors and pressure transducers to interface with the Quantum™ HD. The software program within the Quantum™ HD is constantly looking at these Input channels, via communications, and based upon what the voltage or current level of the channel is, will provide the necessary control for an associated action.

Analog inputs arrive at the board on connectors P4 through P10. Each of these connectors can receive two channels (for a total of twenty-four).

Refer to the following chart for a listing of possible input channel configurations.

Table 10. Analog Board Input Configuration Table

Channel	ICTD	0-5Vdc	0-10Vdc	0-20mA	POT (Potentiometer)	CT (Motor Current)	Accelerometer (Vibration Monitoring)	RTD (Motor Protection Only)
1	*	*	*	*				*
2	*	*	*	*				*
3	*	*	*	*				*
4	*	*	*	*				*
5	*	*	*	*				*
6	*	*	*	*				*
7	*	*	*	*				*
8	*	*	*	*				*
9	*	*	*	*				*
10	*	*	*	*				*
11	*	*	*	*				*
12	*	*	*	*				*
13	*	*	*	*				*
14	*	*	*	*	*			
15	*	*	*	*	*			
16	*	*	*	*		*		*
17	*	*	*	*			*	*
18	*	*	*	*			*	*
19	*	*	*	*			*	*
20	*	*	*	*			*	*
21	*	*	*	*			*	*
22	*	*	*	*			*	*
23	*	*	*	*			*	*
24	*	*	*	*			*	*

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ANALOG OUTPUTS

An Analog Output is the portion of the hardware that the Quantum™ HD uses to provide control. With the Quantum™ HD, this output is typically a 4-20 mA signal that is outputted to an external device. This device is usually a customer specific application, such as to simply receive a signal back from the Quantum™ HD providing the Slide Valve Position to an external application (perhaps a PLC), as an example. The output can be set as a 0-20mA signal in the calibration of the output by accessing Menu > Calibration > Output.

The 4-20mA signal can be altered if necessary to a Vdc signal by using a resistor at the input of the device being controlled. Refer to the following chart for values:

Table 11. Resistor Values

Original signal	Desired signal	Resistor to use
4-20mA	1-5Vdc	250 ohm, 1%, 1/4 watt
4-20mA	2-10Vdc	500 ohm, 1%, 1/2 watt
0-20mA	0-5Vdc	250 ohm, 1%, 1/4 watt
0-20mA	0-10Vdc	500 ohm, 1%, 1/2 watt

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TROUBLESHOOTING THE ANALOG INPUTS AND OUTPUTS

Some problems that are encountered involve troubleshooting the Analog inputs and outputs. The Analog Board has twelve Analog I/O board connectors labeled P4 through P10. The external Analog devices are wired to a connector plug. Position 1 connects to the plus (+) of the external device for channel 1, position 2 connects to the signal (SIG) of the external device for channel 1 and position 3 connects to ground (GND) of the external device for channel 1. Position 4 connects to the plus (+) of the external device for channel 2, position 5 connects to the signal (SIG) of the external device for channel 2 and position 6 connects to ground (GND) of the external device for channel 2, as shown below:

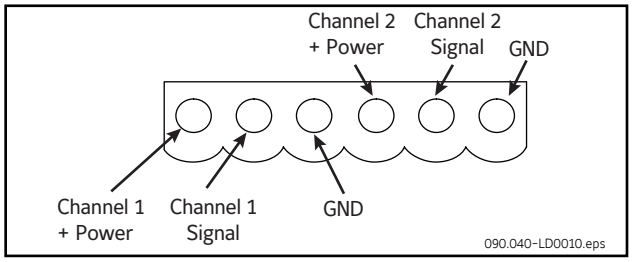

Figure 18. Signal Connections

Each channel is setup through software calibration for the proper transducer type and range, and each transducer must be calibrated through the appropriate sensor calibration screen. Improper setup of either the hardware or software will result in improper operation or range.

The most common fault associated with the improper reading of the analog channels other than hardware or software setup problems fall into one of the following categories:

- Sensor fault
- Wiring problem
- Improper grounding of system

An open wire, shorted or shunted wire, or faulty sensor will usually give a reading at either the minimum or maximum end of the range scale. An erratic reading or a reading that seems to float up and down is usually indicative of a grounding problem. When a single transducer or cable is shorted to earth (or system) ground, this can show up as a whole assortment of problem channels. The easiest way to find a short to earth problem is to disconnect all the sensor plugs and ohm out each plug screw terminal to earth for open (infinite) impedance. All sensors should read open to earth with the exception of the CT motor current channel. One side of the CT is grounded in the Motor Control Center (MCC). (The third pin on pressure sensors is ground.)

REPLACING A DEFECTIVE ANALOG BOARD

The procedure to replace an Analog board is outlined below:

1. Shut off control power.
2. Unplug all connectors from the board.
3. Remove the old board from the machine and remove the new board from its packing and place both on an anti-static surface.
4. Check that all jumpers and dipswitches are properly setup on the new board as it was on the old board.
5. Install the modified replacement board in the panel.
6. Plug all connectors back in.
7. Turn on control power.
8. After replacing or installing an Analog Board and powering on the control panel, the processor will start to communicate to the new board automatically. If this does not occur power down the panel and check the dipswitch settings. If correct re-power the panel.

If an I/O board is removed for any reason an I/O Comms fail message for that board will occur. It will be necessary to do a **[Redect I/O Comms]** to reset the processor memory as to which boards it is communicating to. Always check the about screen after a Redetect to be sure that all boards are accounted for.

PHD VIBRATION ANALYSIS

The Frick™ 32 channel analog board has the built-in capability to directly receive signals from vibration accelerometers, and motor stator RTDs (100 Ω platinum) which are mounted on the compressor housing and/or the motor/shaft. The purpose of these devices is to monitor compressor plus motor/bearing vibration and/or motor bearing plus motor stator temperature.

Accelerometers transmit continuous signals to the analog board. The Q5 Processor Board software monitors these signals, and can detect any variations in the frequency of the vibration. If the vibration levels increase over time, predefined setpoint limits may be exceeded, resulting in a warning from the Quantum™ HD notifying the operator of the condition. If the alarm is not addressed, a shutdown will occur to prevent damage to the compressor. Likewise, if an RTD is used for bearings, it will measure the temperature of the motor bearings and stator, which may increase (due to lack of lubrication).

Typically, all PHD related connections will be to Analog Board # 1. However, if monitoring of both motor bearing vibration and temperature is required, the temperature sensors will be wired to Analog board #2, channels 19 and 20. Refer to the drawing at the bottom of this page for the wiring connections of the different possible configurations.

The full wiring diagram may be found later in this manual in the Quantum™ HD Drawings section. Additional information on PHD vibration monitoring and theory may be found in the PhD Vibration Monitoring System manual (E70.020-TB).

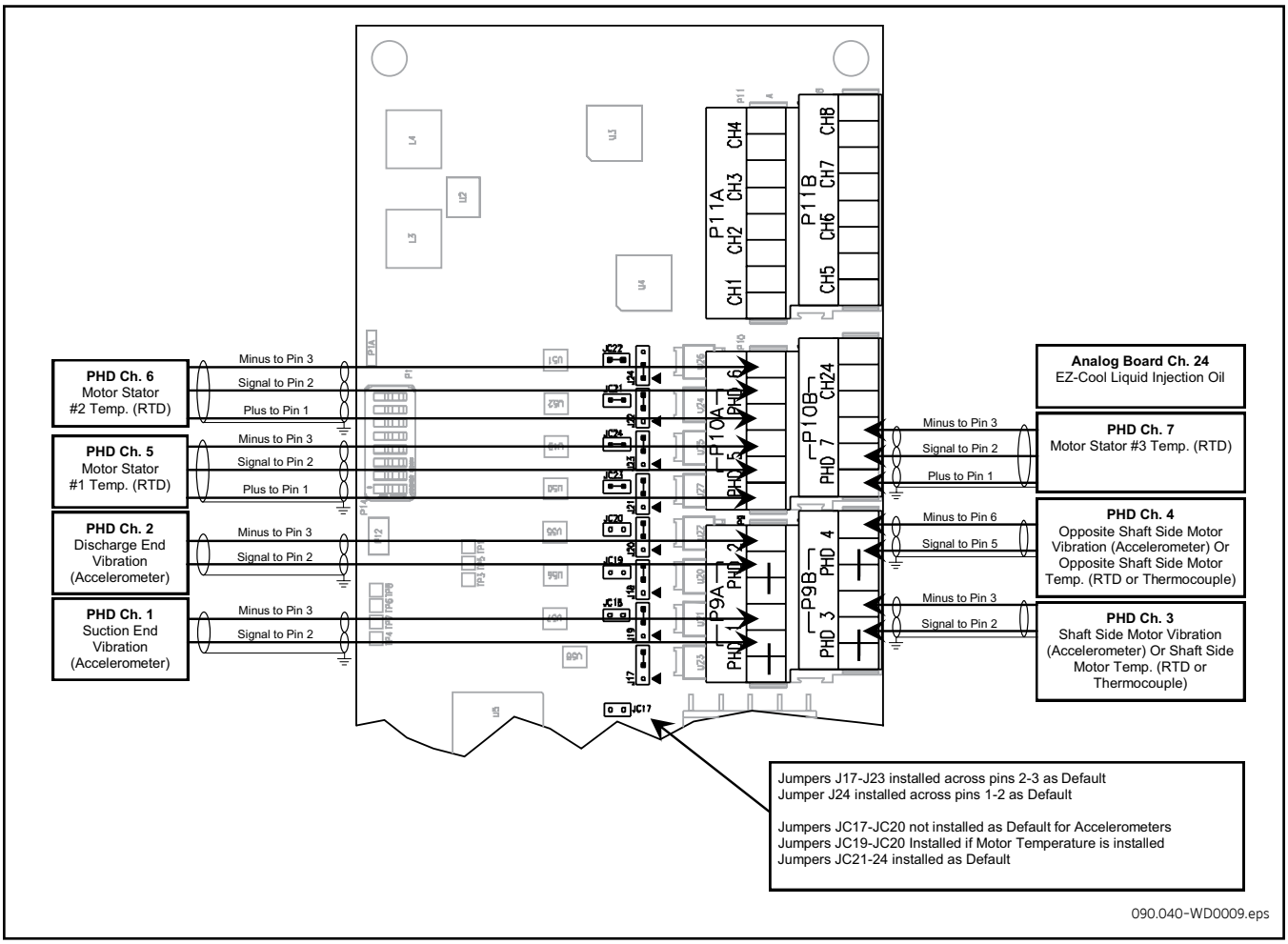

Figure 19. PHD Connections (Analog Board #1)

CURRENT TRANSFORMER (MOTOR AMPS)

Channel 16 of Analog Board 1 is dedicated to reading motor amps, either through the use of the on board current transformer when using a 0-5 amp CT, or from an external source. When reading motor amps directly at the P8 terminal strip from a CT, the input signal cannot exceed 5 amps. An external DC Ma or voltage device, may be used as an alternate method of reading motor amps. Connect the wiring to connector P7B as shown in the diagram below:

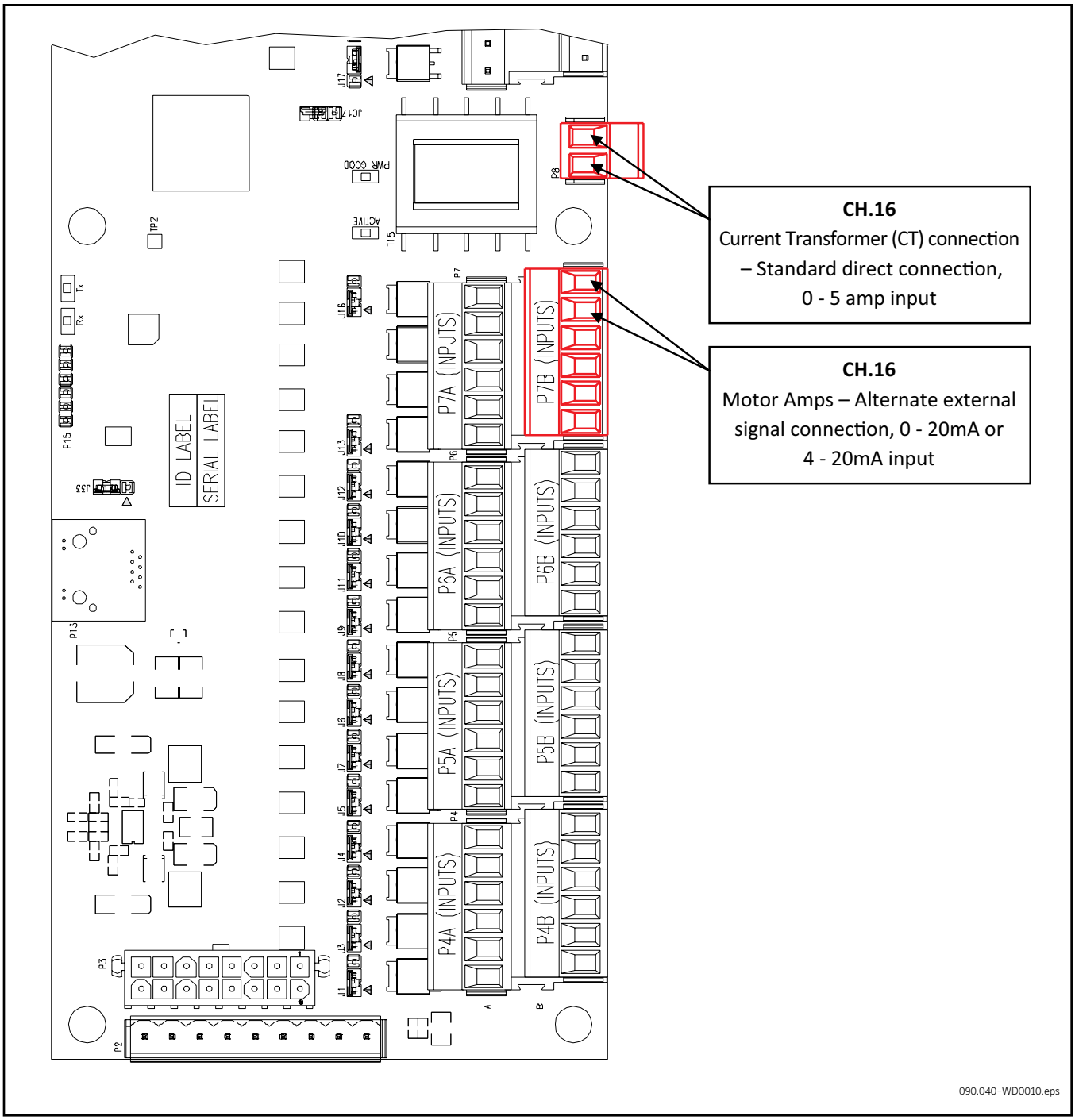

Figure 20. Current Transformer

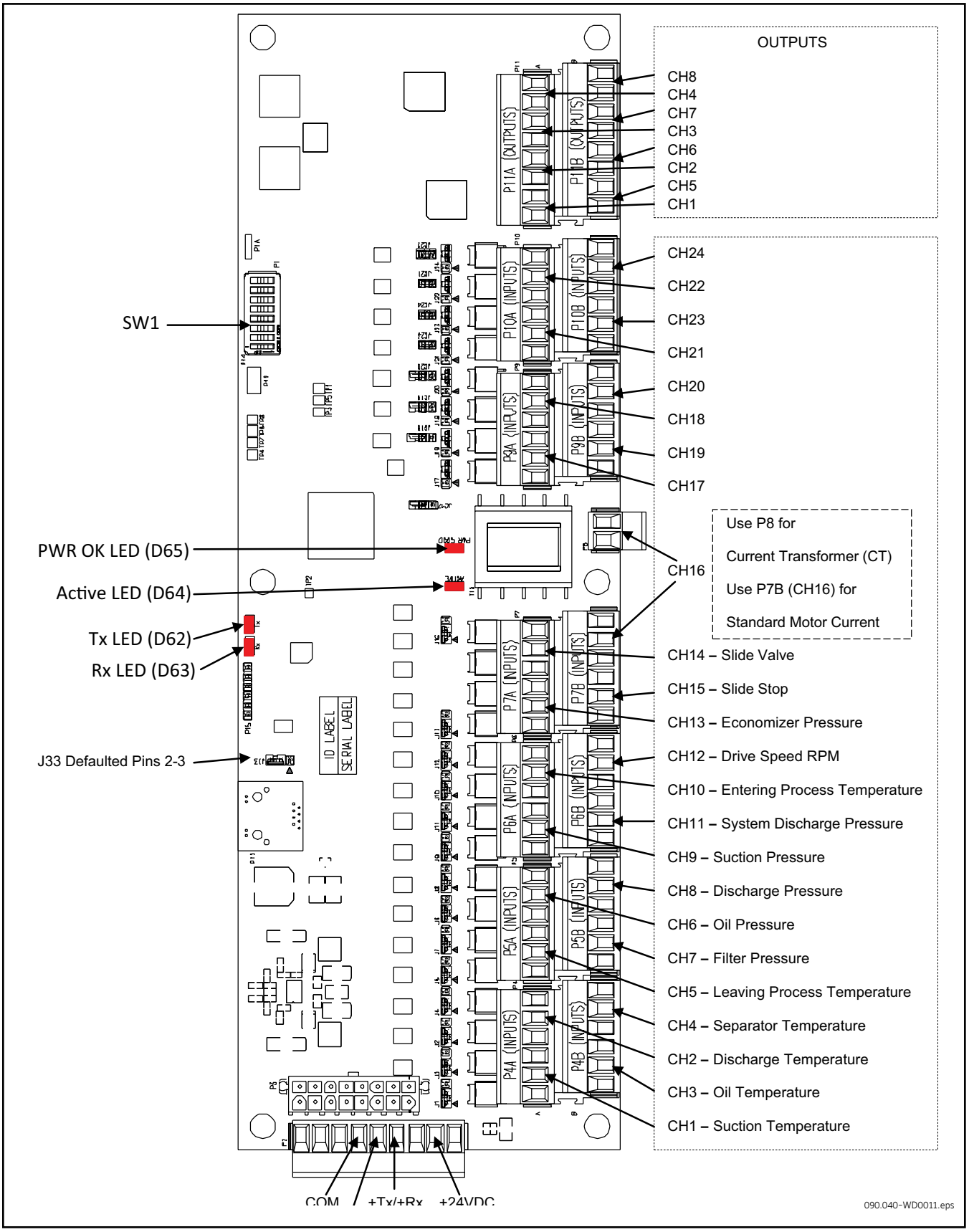

Figure 21. Analog Board #1

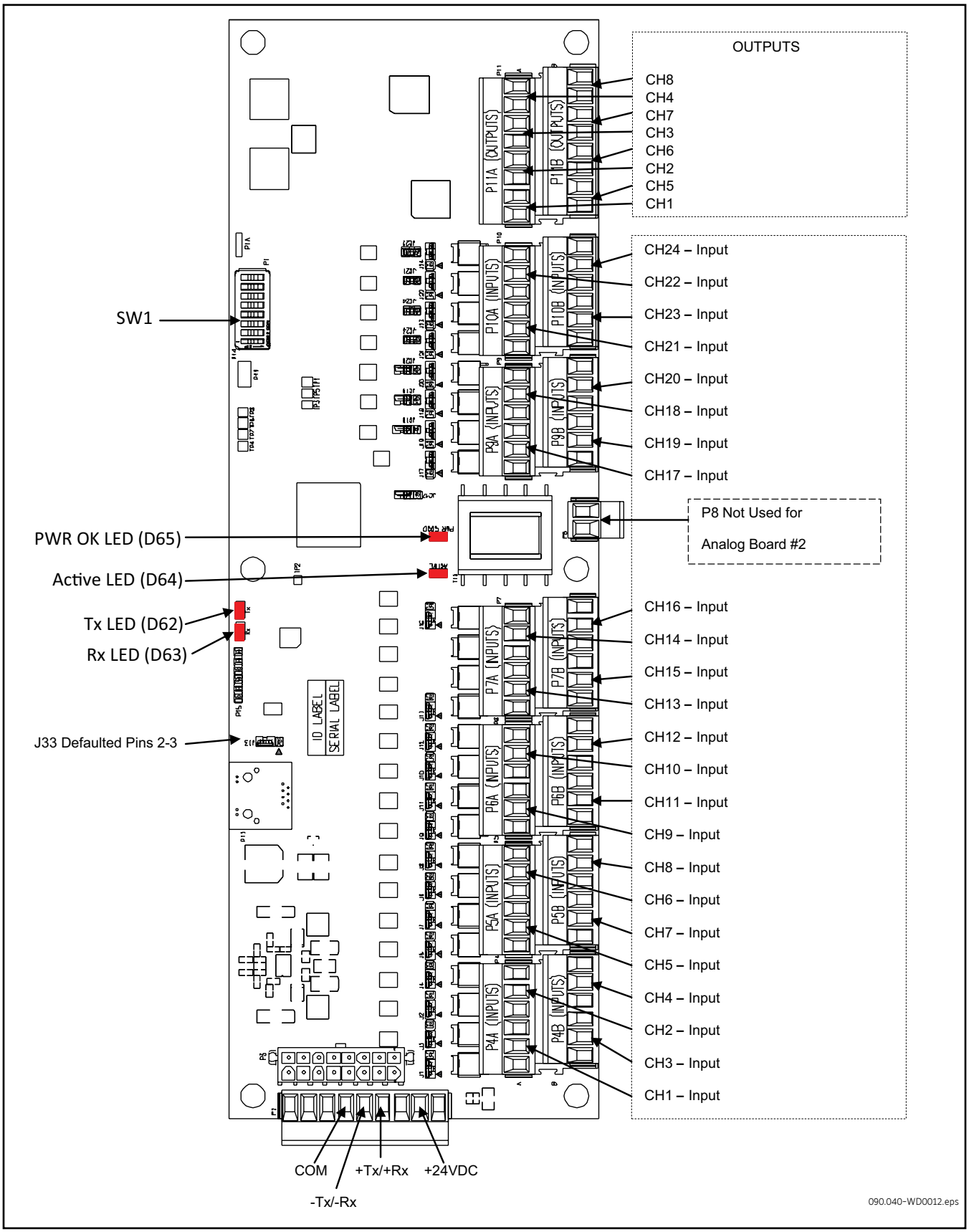

Figure 22. Analog Board #2

ANALOG BOARD SETTINGS

Table 12. Communications

The following table is to be used when configuring the Quantum HD for external communications.

J33	Pins 1-2	120 ohm long communications line termination.
	Pins 2-3 *	No termination.

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Table 13. Dipswitch Settings (Used to set board address)

The following table is to be used to set the analog board addresses. If there is only one board installed, it should be set as board #1, if there are two boards they each need to be set according to the wiring diagrams.

	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8
Board #1	Off	Off	Off	Off	Off	Off	Off	Off
Board #2	On	Off	Off	Off	Off	Off	Off	Off

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Table 14. Analog Board Jumper Settings

Jumpers shown are the default jumper settings per analog board. See wiring diagrams for correct jumper settings.

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12
Analog Bd #1	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Analog Bd #2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2

	J13	J16	J17	J18	J19	J20	J21	J22	J23	J24
Analog Bd #1	1-2	1-2	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3
Analog Bd #2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2

	JC17	JC18	JC19	JC20	JC21	JC22	JC23	JC24
Analog Bd #1	OUT	OUT	OUT	OUT	IN	IN	IN	IN
Analog Bd #2	IN	IN	IN	IN	IN	IN	IN	IN

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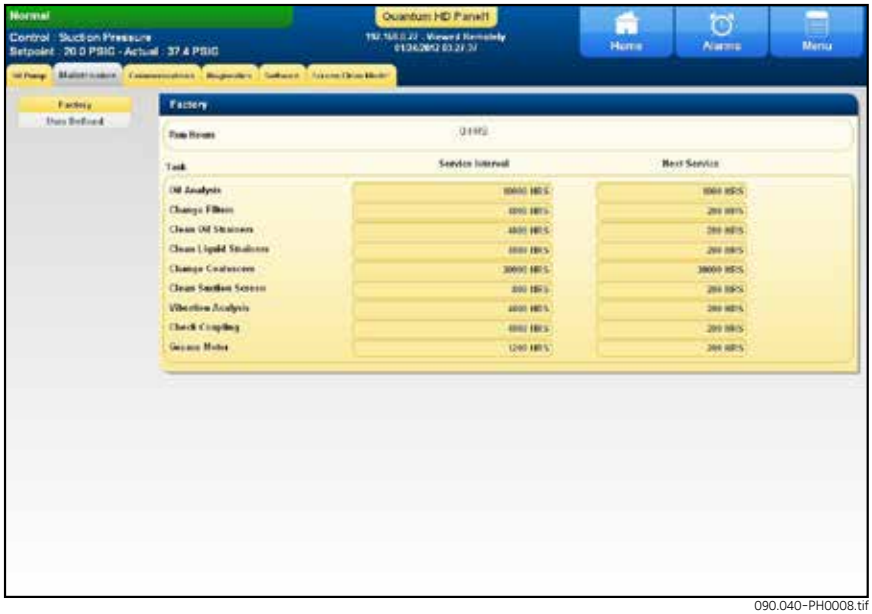
PINS 1-2 ARE FOR 30mA MAX SENSOR POWER (ie. ICTD, PRESSURE TRANSDUCER, PRESSURE TRANSMITTERS, LINEAR TRANSMITTERS, ANY DEVICE THAT REQUIRES 9-28VDC POWER)

PINS 2-3 ARE FOR 3mA MAX SENSOR POWER (ie. RTD'S [PT100], ACCELEROMETERS)

NOTES

SECTION 7

SERVICE SCREENS



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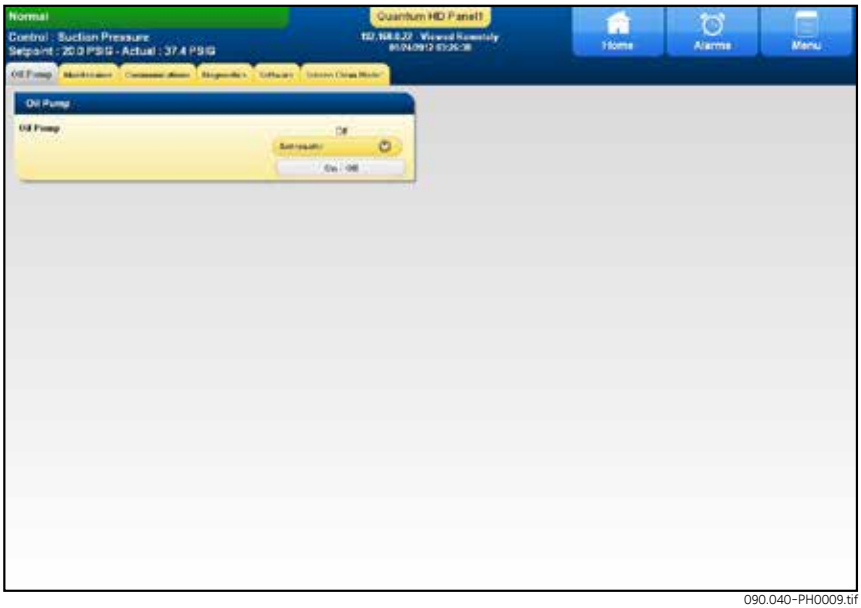
SERVICE SCREENS

The Quantum™ HD panel features numerous Service related screens, which will facilitate troubleshooting and general maintenance. Some of these screens are located in the main Menu under Service, and others are located in Status, Configuration and About screens. The following pages describe these screens, and can be accessed by selecting the SERVICE, STATUS, CONFIGURATION or the ABOUT icons from the main MENU.

SERVICE - OIL PUMP



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ACCESSING: Service → Oil Pump

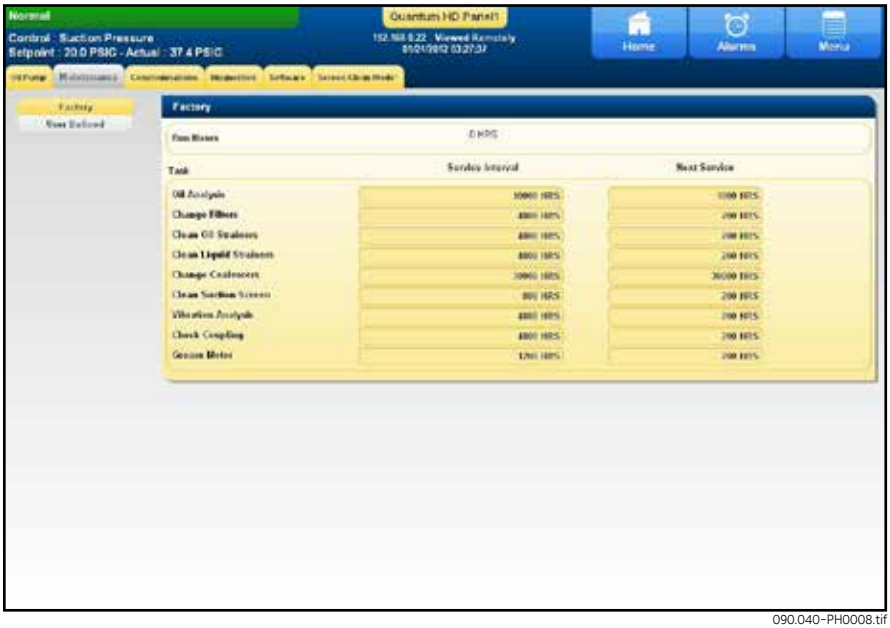
DESCRIPTION: This screen allows for setting and checking the status of the Oil Pump (option). The current condition of the Oil Pump is shown as being either ON or OFF.

The following additional information is provided on this screen:

A toggle button is provided to select between:

- **Manual** - The user has control over the running of the pump. To run the pump, simply observe the gray button below the Automatic/Manual button to ensure that the pump is not already running, and if not, then press the **[On/Off]** toggle button. The Oil Pump status text indicator will change from Off to On. To stop the pump, press the toggle button again, and the pump indicator will change to Off. If the Oil Pump toggle button is set for Automatic, it will change to Manual if the **[On/Off]** button is pressed.
- **Automatic** - If the pump is set to Automatic mode, the Quantum™ HD software program is controlling the pump operation. In this mode, if the toggle key is pressed, the mode will be changed from Automatic to Manual Mode, and the current state of the pump (digital output 3) will also toggle to ON.

SERVICE - MAINTENANCE (FACTORY)



090.040-PH0008.tif

ACCESSING: Service → Maintenance → Factory

DESCRIPTION: This screen has been provided to aid the service technician with keeping track of system maintenance, and can be accessed from the main Menu. The Tasks will appear on the Events screen after the Next Service values has been reached.

The following additional information is provided on this screen:

Run Hours - The value shown here is the total number of hours that the compressor motor has actually been in the running state. This value can be reset (or changed to any value from 0 to 1,000,000 Hours) from the Configuration > Package screen.

Task - This column shows a list of nine pre-defined maintenance items that may be tracked (an additional 7 custom items may be tracked on the User Defined screen, see the next page):

- Oil Analysis
- Change Filters
- Clean Oil Strainers
- Change Coalescers
- Clean Suction Screen
- Vibration Analysis
- Check Coupling
- Grease Motor

Service Interval - This column defines a period of time (in hours) that will cause messages from the Task column to be logged into the Event Log. Set this column to the number of hours between the maintenance check that is defined as the Task. Once this time has been achieved, a message will be logged in the Event Log, and the value that is currently shown in the Next Service column will have the value from the Service Interval added to it.

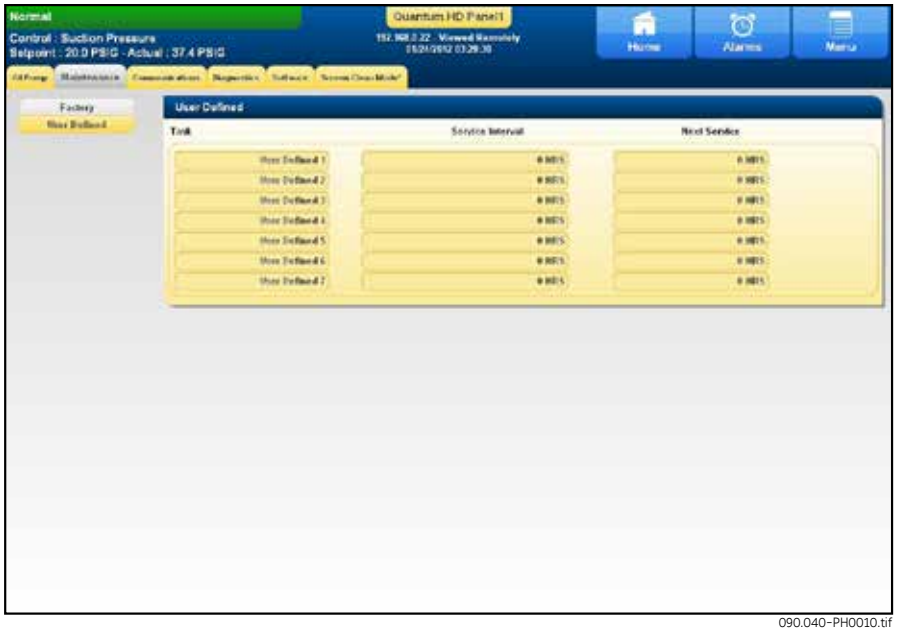
Next Service - This column is initially is set to a default value, which the user may change. Once changed, this value will become the number of hours that the compressor must run before the particular Task will be logged into the Event Log. Once the event has occurred, this value will then be updated by the value from the Service Interval column.

EXAMPLE: We will use Oil Analysis for instance. When the compressor is running, the value in the Next Service column is being clocked. After 1000 hours of compressor run time, a message will be generated and placed on the Event Log screen. This particular message will read Oil Analysis, with a date/time stamp. This message will remain in the Event Log until cleared. This message is to notify the operator that it is time to have the Oil checked. At this point, the operator should notify the proper maintenance personnel that the appropriate maintenance be performed. The user should access the Event Screen on a regular basis (perhaps once per week) to review the information provided there.

Once the message has been entered in the Event Log, the values for the row will be automatically updated, with new values as predetermined by an internal programmed maintenance schedule. The values for the Next Service column are based upon the Compressor Run Time hours.

From here, the service technician can view nine maintenance schedules. This screen is based upon the Maintenance Schedule that is provided in the IOM manual for the specific compressor package.

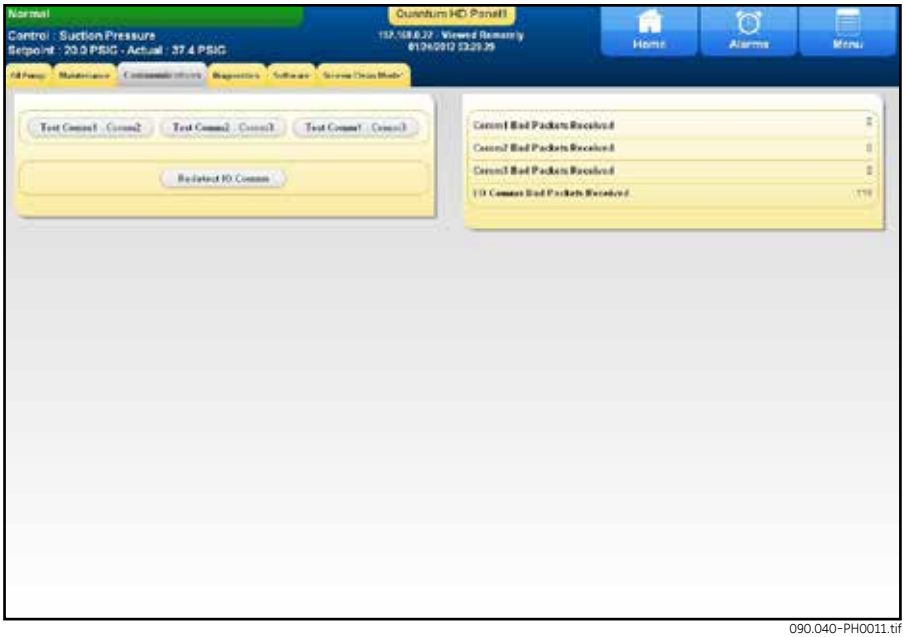
SERVICE - MAINTENANCE (USER DEFINED)



090.040-PH0010.tif

DESCRIPTION: This screen has been provided to aid the service technician with keeping track of system maintenance, and can be accessed from the System Status screen. From here, the service technician can view up to eight (8) user definable tasks. Each Task may be custom named to best describe its function. Simply touch the Task that you wish to rename, and a keyboard will appear on screen. The **[Service Interval]** and **[Next Service]** columns function the same as the description on the previous page.

SERVICE - COMMUNICATIONS



090.040-PH0011.tif

ACCESSING: Service → Communications

DESCRIPTION: This screen allows the technician to verify and troubleshoot serial communications issues.

The following buttons are provided (refer to the Communications Manual (090.040-CS) for specific information about these three tests):

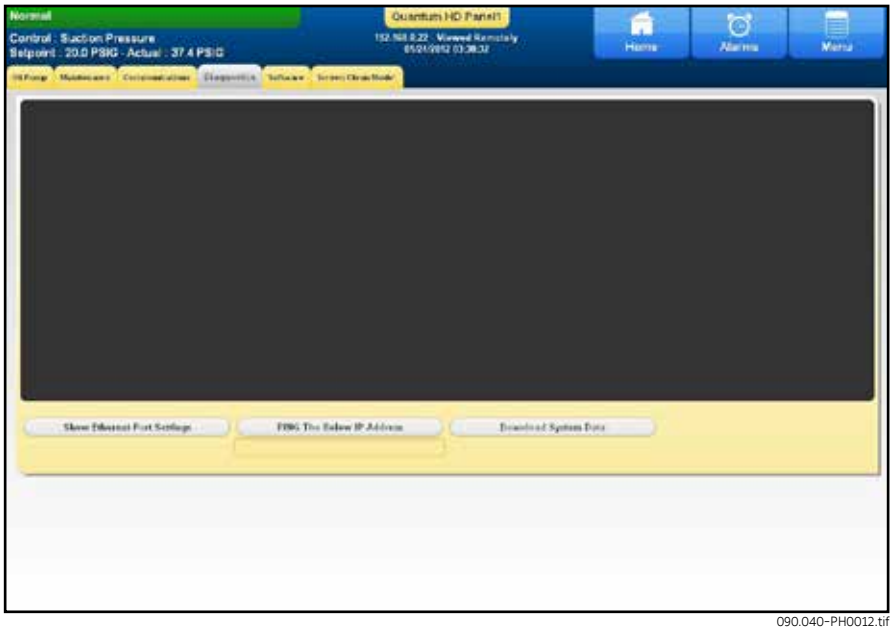
- **Test Comm1 - Comm2**
- **Test Comm2 - Comm3**
- **Test Comm 3 - Comm1**
- **Redetect I/O Comms** - This selection provides a method to detect all connected Analog and Digital boards. For additional information about this screen, refer to 090.040-CS (Communications Manual).

The following are some of the things that can occur that would cause an I/O board to stop communicating with the Quantum™ HD, and would require that you Redetect I/O Comms:

- A board has been removed, and power was turned on with the board removed. You would need to replace the board, re-power, and then select **[Redetect I/O Comms]**.
- A board has failed in such a way that it cannot properly communicate with the Quantum™ HD.
- A failure with the communications cable which is plugged into the end of each board

If any of these things occur, a communications error shutdown will be issued until this key is selected. You should always view the About screen to see what has been detected.

SERVICE - DIAGNOSTICS



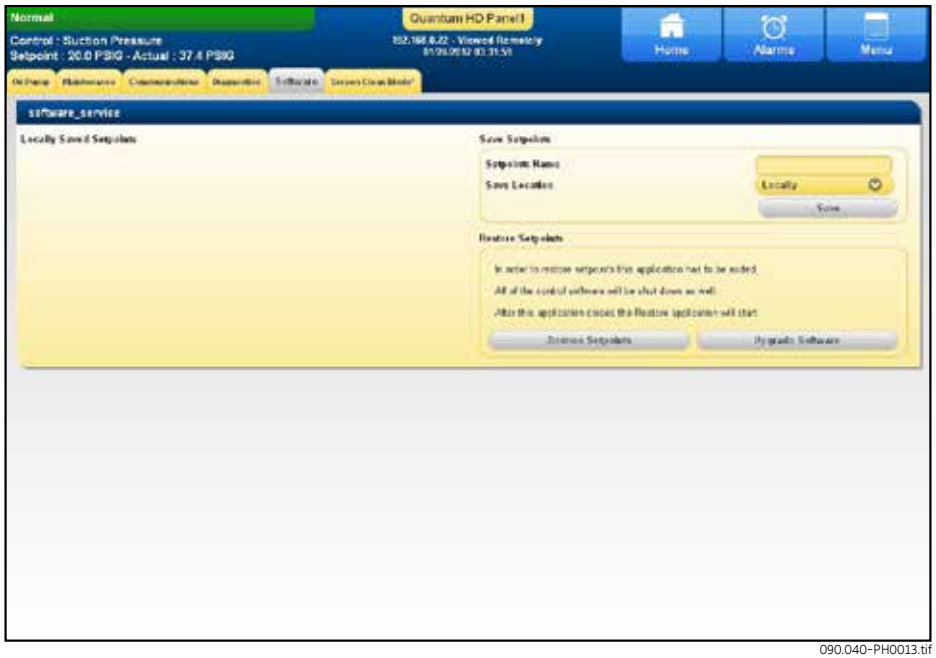
090.040-PH0012.tif

ACCESSING: Service → Diagnostics

DESCRIPTION: This screen provides for three different Communications related troubleshooting items:

- **Show Ethernet Port Settings** - Pressing this button will cause the Ethernet Port Settings to be shown.
- **Ping the Below IP Address** - There is a setpoint box located below this button. Select this box to call up a numeric keypad. Enter the IP address that you wish to PING, then press the **[PING The Below Address]** button. The results of the PING will be shown.
- **Download System Data** -

SERVICE - SOFTWARE



090.040-PH0013.tif

ACCESSING:

DESCRIPTION: This screen has been provided as a way for the user to save and restore setpoints, and to upgrade software.

NOTICE

Before accessing this screen, it is recommended that a USB drive device (P/N 649A1063G99) be plugged into a USB port of the Q5 Processor Board. Refer to the following pictorial for USB port locations:

Perform the following steps to prepare the Quantum™ HD for software maintenance:

- Ensure that all setpoint values have been documented as a safety precaution.
- Stop the compressor.
- With power ON, insert the USB device into a provided USB port of the Q5 Processor Board (see above).
- Access the main **[Menu]**.
- Select the **[Service]** Icon.
- On the Service screen, select the Software tab.

The following selections have been provided:

Setpoints Name - Enter a custom name here. This is similar in function to a file name. It cannot be blank.

Save Location - This is defaulted to Locally.

Save - Use this button to save all setpoints and custom text to a USB device as a form of backup:

- Press **[Save]** button to Save Setpoints.

Once the setpoints have been saved, the name of the setpoint file that you created will appear on the left side of the screen, followed by a time/date stamp. Multiple setpoint files can be saved, as shown.

090.040-PH0004.tif

Q5 Processor Board USB Plug-in locations

Figure 23. USB Plug-in Locations

Restore Setpoints – Use this option to Restore the setpoints only (custom text that has already been changed will not be affected) for a particular unit:

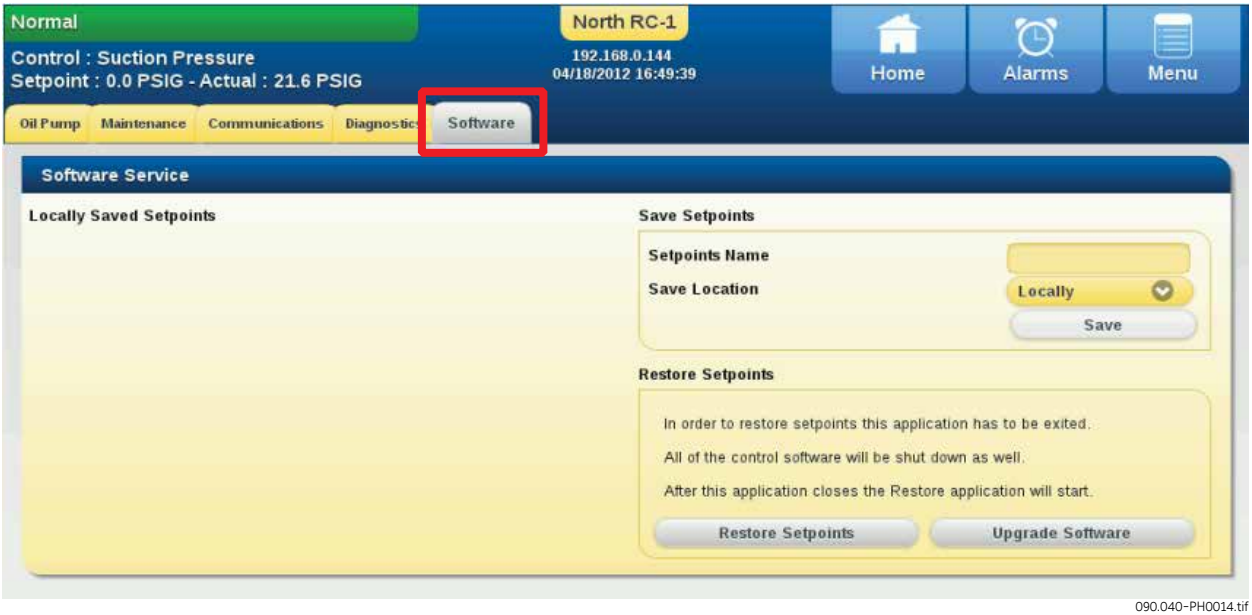
- Ensure that all setpoints have been documented as a safety precaution. Install the previously saved setpoints USB device into the provided connection on the Quantum™ HD.
- Enter the name or number from the available list at the left side of the screen that corresponds to the saved setpoints that you'd like to restore, then press the **[Restore Setpoints]** button.

Upgrade Software - Updating the Operating Software on a Quantum HD is easy and free. Use the steps described below to download the update and upload it to your Quantum HD controllers. Some enhancements may require additional hardware.

To save the Operating Software Upgrade file, simply right click on the file and save to a USB Thumb Drive. Save to the Top Level, Root Directory only. Saving to a sub-folder will prevent the upgrade file from being read by the Quantum HD processor. The file can also be saved to a computer hard drive for future access.

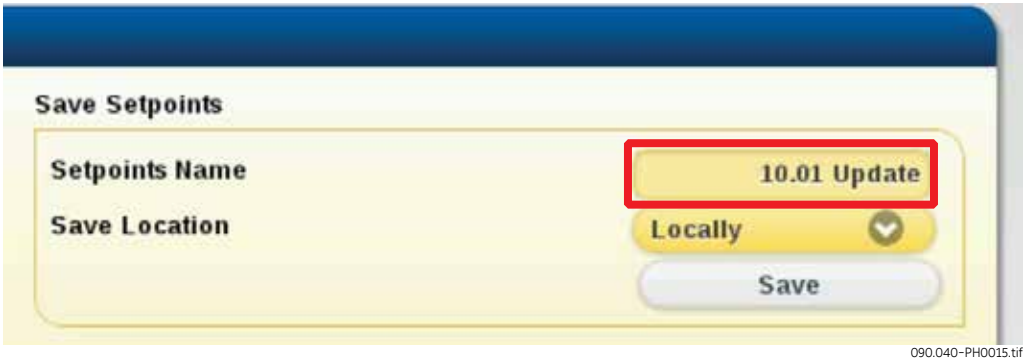
Once you have downloaded the update to a USB thumb drive, it can be used to update an infinite number of Quantum HD Controllers.

Before doing the update you first need to save the setpoints of the controller being updated. The update will reset all settings to the default values. After the update is done the setpoints are restored from the saved file for that controller.



090.040-PH0014.tif

Save Setpoints –To save setpoints the user must be logged into the Service level. Press the Menu button and select Service then select the **[Software]** at the top of the screen as shown below:



090.040-PH0015.tif

In order to save a setpoints file it must first be named as shown below. To do this touch the **[Setpoints Name]** button to activate the keypad. Enter the desired name and press enter.

090.040-PH0016.tif

The setpoints can be saved either Locally (default) to the flashcard on the processor or to a USB Thumb Drive that is inserted into the USB port of the Quantum HD processor. Select the **[Save Location]** button to choose the location to which the setpoints will be saved.

The same thumb drive that is being used for the program update can be used to save the setpoints of the controller prior to doing the update. It is recommended that all locally saved setpoints be backed up to a USB thumb drive and stored in a safe, secure location.

Once all of this done simply press the Save button to save the setpoints to the selected location.

If the setpoints are saved Locally the file name, date and time will be listed on the left side of the screen as shown below.

Once the setpoints are saved, the Operating Software can

090.040-PH0017.tif

be updated. With the USB thumb drive with the update is plugged into the USB port of the processor board, select the Upgrade Software button.

Once after the Upgrade Software button is pushed the screen will display HD Loading and then the Install page appears as shown below

To do the install touch the Full System Install button. To abort the upgrade, touch the Exit button.

Once the update is finished the Please Wait message will appear and then Operation Complete. Touch the OK button, then the Exit button.

Once the Exit button is touched you will be prompted "Are You Sure". Touch the button for the appropriate response. When exiting the HD Loading screen will appear briefly. After several seconds, the Quantum HD home screen will reload. It will be necessary to Login to the service level to restore the saved setpoints and calibration data.

Once logged in, go to Menu, select Service then select the Software tab as before. Once on the software page select Restore Setpoints.

Once restore setpoints is selected the available files will be displayed what is on the flash card (locally saved) and/or on the USB device (Thumb Drive) as seen below. Use the keypad to select the associated number for the setpoints and calibration data file you wish to restore and touch OK.

You will be prompted to Restore Calibration Data. If the setpoints were saved from this compressor press Yes, if the setpoints file was saved form another compressor press No. Pressing No means that the Calibration Data will be defaulted and will need to be redone.

Once the setpoints are restored the below screen will appear. Press Exit to finish this process. Press Yes that you wish to exit. The HD Loading... screen will appear briefly. In several seconds the Quantum HD home screen will reload. The Operating Software Upgrade and Setpoints Restore is complete.

STATUS - VYPER INFO

090.040-PH0018.tif

ACCESSING: Status → Vyper

DESCRIPTION: This screen is for informational purposes only, as there is nothing that can be changed. The data that is populated here is received via serial communications from an optional Vyper drive unit.

STATUS - FILTER INFO

090.040-PH0019.tif

ACCESSING: Status → Filter Info

DESCRIPTION: This screen is for informational purposes only, as there is nothing that can be changed. The data that is populated here is received via serial communications from an optional Vyper drive unit.

STATUS - PANEL (ANALOG)

090.040-PH0020.tif

ACCESSING: Status → Panel → Analog

DESCRIPTION: The Analog Service Screen has been provided to view the raw data from an Analog Board. Input Channels 1 through 24 as well as Output channels 1 through 8 are shown for Analog Board 1, and optionally for Analog board 2 (if installed). Analog values are converted from binary to show volts. The error factor is +/- .05 volts. This is an informational screen only.

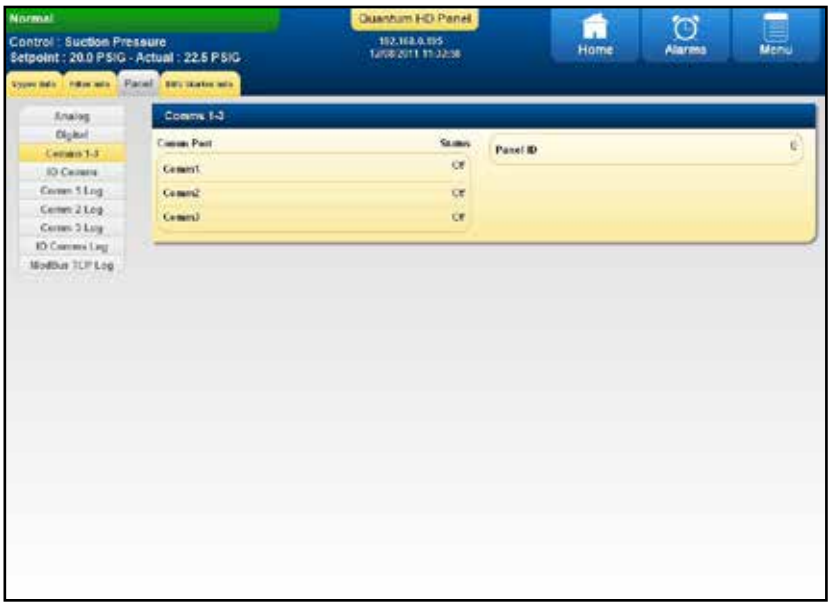
STATUS - PANEL (DIGITAL)

090.040-PH0021.tif

ACCESSING: Status → Panel → Digital

DESCRIPTION: The Digital Service Screen has been provided to view the On/Off status of each of the 24 available I/O channels for Digital Board 1, and optionally Digital Board 2. This is an informational screen only.

STATUS - PANEL (COMMS 1-3)



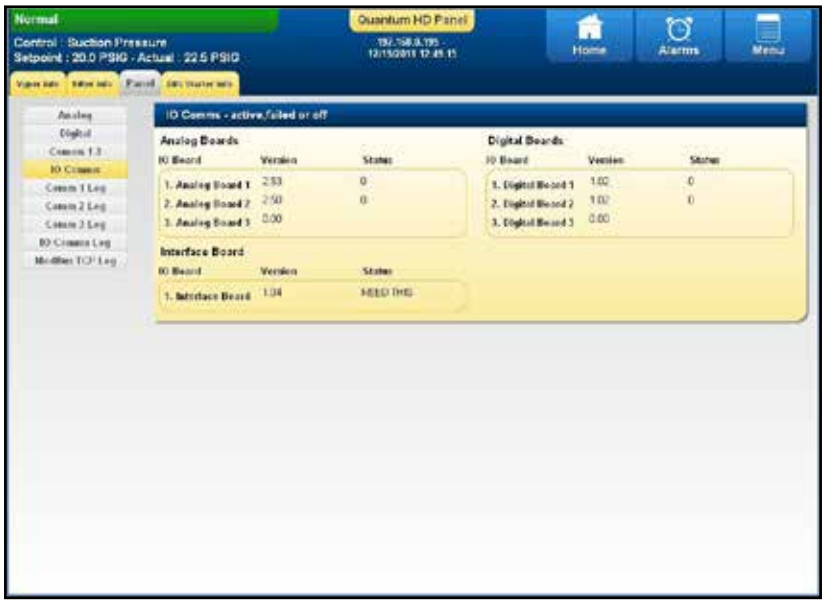
090.040-PH0022.tif

ACCESSING: Status → Panel → Comms 1-3

DESCRIPTION: The Comms 1-3 screen is for informational use, and provides the current status of each of the three usable serial communications ports. When a particular port is in use, the status for that port will change from Off to Active (to indicate it is functioning) or Failed (if the port is trying to communicate, but has timed out).

Additionally on this screen is the current value of the Panel ID number. The Panel ID is set by accessing the Menu > Configuration > Communications > Serial tab.

STATUS - PANEL (IO COMMS)



090.040-PH0023.tif

ACCESSING: Status → Panel → IO Comms

DESCRIPTION: The I/O Comms screen is for informational use, and provides the current software version of each of the installed and recognized I/O control boards. Additionally, the current communications status is shown for each board.

STATUS - PANEL (COMM 1-3 LOG)

090.040-PH0024.tif

ACCESSING: Status → Panel → Comms 1-3 Log

DESCRIPTION: The screen shown above represents the Comm 1 communications log, however, the same style screen will appear for Comm 2 and Comm 3 also, with the title being replaced to reflect the Comm log that is being viewed. This is an informational screen only, and provides a listing of the most recent data that has been sent or received from the port being viewed.

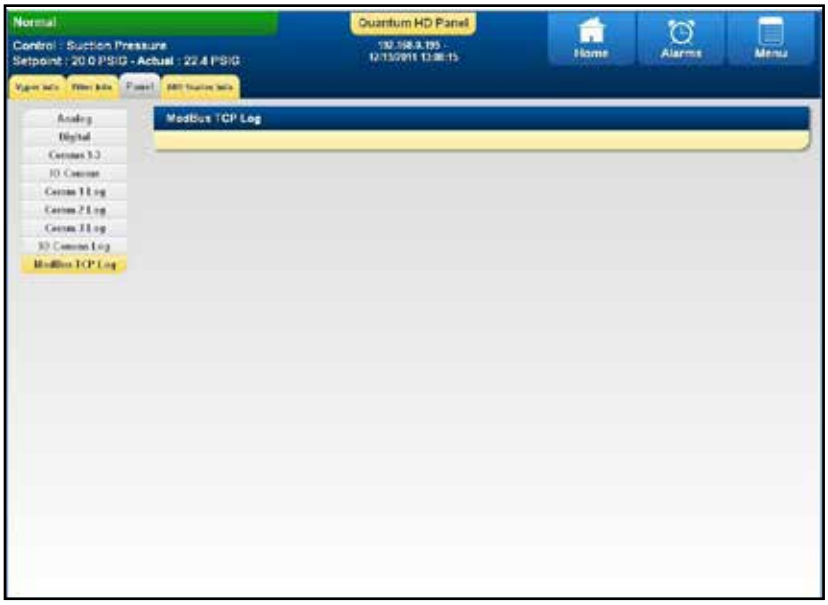
STATUS - PANEL (IO COMMS LOG)

090.040-PH0025.tif

ACCESSING: Status → Panel → IO Comms Log

DESCRIPTION: The screen shown above represents the combined activity of all serial communications, viewable at one time. This is an informational screen only, and provides a listing of the most recent data that has been sent or received through all serial communications.

STATUS - PANEL (MODBUS TCP LOG)

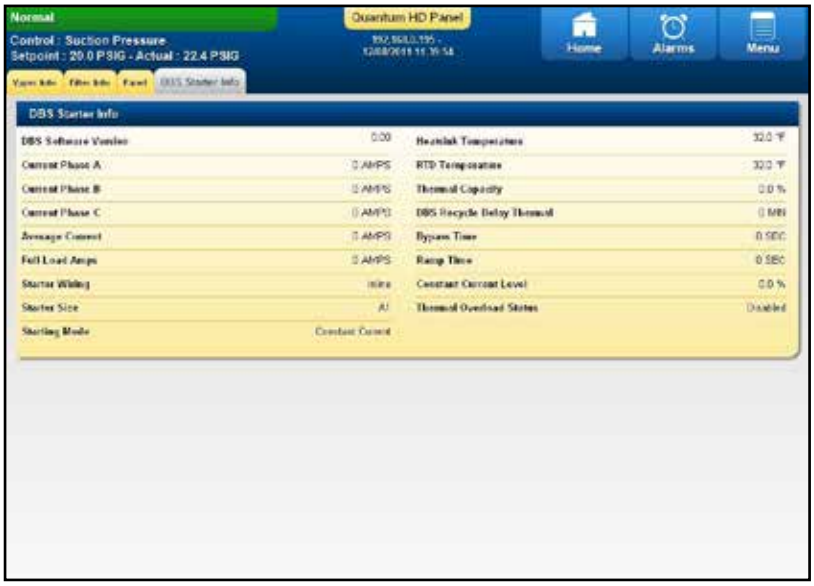


090.040-PH0026.tif

ACCESSING: Status → Panel → ModBus TCP Log

DESCRIPTION: The screen shown above represents the ModBus communications packages that have been sent or received from all serial communications, viewable at one time. This is an informational screen only.

STATUS - DBS STARTER INFO

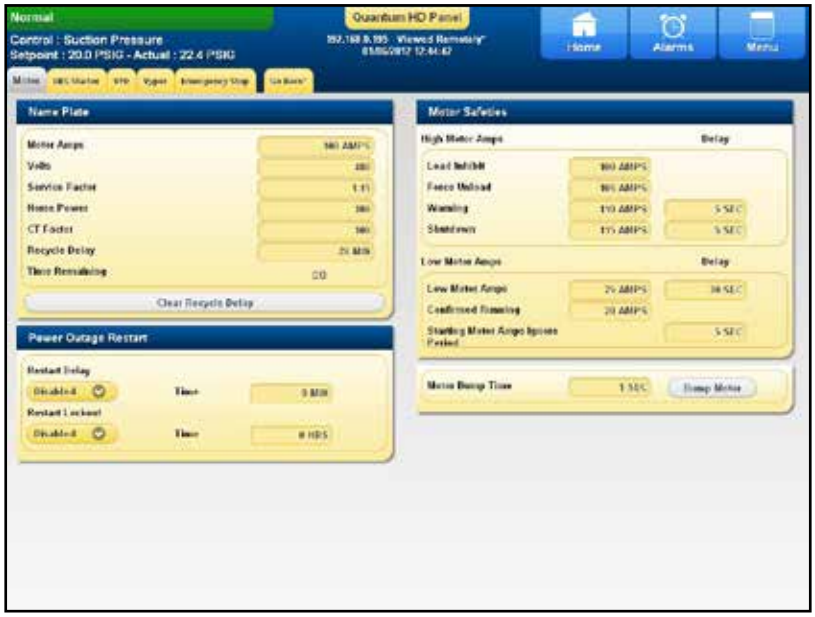


090.040-PH0027.tif

ACCESSING: Status → Panel → DBS Starter

DESCRIPTION: This screen is for informational purposes only, as there is nothing that can be changed. The data that is populated here is received via serial communications from an optional DBS Solid State drive unit.

CONFIGURATION - DRIVE (MOTOR)



090.040-PH0028.tif

ACCESSING: Configuration → Drive → Motor

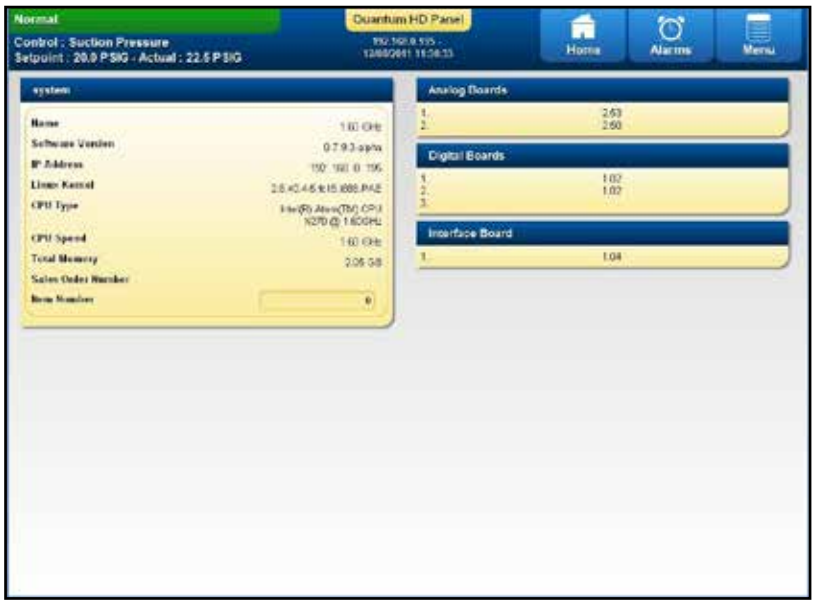
DESCRIPTION: This screen provides for a method of "bumping" the motor. This would be particularly useful when performing the initial unit startup, or in the event that the motor should need replacing (to verify proper 3-phase connections).

To perform the motor bump, set the time for the desired length that you require the motor to run, then press the **[Bump Motor]** button. The motor will turn for the period of time that has been set.

NOTICE

USE THIS FEATURE WITH CAUTION, AS DAMAGE TO THE UNIT OR MOTOR MAY OCCUR!

ABOUT



090.040-PH0029.tif

ACCESSING: About

DESCRIPTION: Various information regarding system software and software versions are presented here, as well as all detected I/O control boards, IP address, memory and the unit Sales Order. This information is important especially when contacting a service representative.

NOTES

SECTION 8

TROUBLESHOOTING

When there is a problem that makes no sense due to unexplainable things happening, check the following:

1. Were the recommendations for Electrical Installation followed? (See Frick publication 090.400-SB).
2. Is the panel powered by an isolating power source such as a control power transformer in the motor starter panel?
3. Verify that the panel is not powered from a lighting or utility panel.
4. Did the unit ever work properly?
   - If the unit used to work properly, try to determine when the problem first showed up.
5. It is important to know if the problem occurs randomly, frequently, at the same time everyday or all the time.
6. Check what the temperature is in the engine room and at the panel. Is it very hot (>110°F) or very cold (<32°F)?
   - Make sure that the motor is not blowing exhaust air on the control panel.
7. If the problem just started occurring, was there recently a severe lightning storm, fire, flood, or a plant accident:
   - Has any water, refrigerant, or oil leaked into the panel or any conduit?
8. If the problem just started occurring, then check if anything was recently changed in the system (i.e. software or hardware.)
9. If the problem just started occurring, then check if any service was recently done to the compressor or its electrical system?
10. If there is communication wiring connecting the panel to another panel or device, then check the following:
    - If the Quantum™ HD is unexplainably shutting down, try disconnecting the communications cable to see if the problem goes away.
    - Check if the communications cable shields are tied to machine ground at only one location. For a PLC or Opto22 based system, the shield should normally be tied only at the PLC or Opto22 panel.
    - Check that you are using the Frick recommended communications cable.
11. Is the plant wiring up to code? (See Frick publication 090.400-SB)
12. Do you have power wiring (>50V) mixed with control, sensor or communications wiring?
13. Check that the starter panel is grounded to the plant transformer. There are usually four wires: 3 for the 3 phases and 1 for plant ground.
14. Check that the motor is grounded to the starter panel. There are usually four wires: 3 for the phases and 1 for ground.
15. Ensure that one side of the motor current transformer is grounded in the motor starter panel. The wire to the control panel terminal #2 is usually the only one grounded.
16. Check that the pressure transducers are properly grounded.
17. Check that temperature transducers are properly grounded.
18. Check to see if one of the temperature probes have a signal wire shorted to machine ground.
19. Check that all inductive loads (i.e. coils, solenoids, or relays, etc.) connected to the I/O output modules have surge suppressors across them, preferably at the devices. The larger factory installed inductive loads will have surge suppressors as well.
20. Make sure that you have a continuous ground back to the power source (plant transformer). The ground connection must be aluminum or copper. A conduit ground will not work. Do not drive a ground stake at the compressor since extraneous currents will be attracted to the compressor.
21. Make sure that there is no AC wiring lying next to any printed circuit board.
22. Unexplainable compressor auxiliary failures are usually indicative of noise due to wiring problems (i.e. incorrect earth grounds, mixed power and control wiring, unsuppressed coils, etc)
23. If the compressor is unexplainably shutting down, check if the machine shares control transformer power with something else. Make sure each compressor has its own isolation transformer in the motor control center off the three-phase bus with the secondary properly grounded.

TROUBLESHOOTING CHART FOR FRICK® QUANTUM™ HD CONTROL PANEL (REFER TO WIRING DIAGRAMS)

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
DISPLAY IS INOPERATIVE	Check for power at the panel. See if any of the LED's on the Q5 Processor Board are blinking or any lights are blinking on the other boards. If no lights are blinking, make sure the control power switch is switched on. If there are still no lights, then check the circuit breaker (2CB). If the breaker is not tripped, check for power into 2CB. If there is no power, check the external power being supplied. If power from 2CB, check power supply for input AC and output DC level. Shut off power to the panel and first confirm that the display connector is firmly seated. Care needs to be taken when checking and reconnecting or reseatting this connection. Confirm that the connectors at both ends of the backlight inverter are properly connected. Confirm that the display harness is connected properly on the main board. Refer to Section 3 of this manual for more information. Check the display with a flashlight. If characters are visible, the display is good, but the LED backlight stick is not on and may need replaced.
OIL PUMP DOES NOT START	The LED (D3) for Output 3 (MOD 3) of Digital I/O Board #1 should be on when pump is called on to run. If the pump does not start when the LED is on, check for the proper panel voltage between position 4 and 5 on the P1 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F3) and if the fuse is OK, check the output module (MOD 3). If the voltage was OK, check for the proper voltage between position 5 on the P1 DIO connector and position 8 on the terminal strip. If voltage is OK, check for the proper voltage between position 8 and 2 on the terminal strip. If the voltage is OK, check at the oil pump starter. If all of this is OK, then check the Digital Status screen to see if channel 3 is ON. The Oil Pump #1 Auxiliary Contact switches voltage to Input 4 (MOD 4) of Digital I/O Board #1 when the auxiliary contacts are closed. If the input does not turn on, check if the LED (D4) is lit when it should be. If it isn't, check the fuse (F4) and if the fuse is OK, check the input module (MOD 4). Check the voltage between positions 4 and 6 of the P1 DIO connector. If the LED is ON, check channel 4 on the DIO of Digital Board 1, at the Digital Status screen.
OIL PUMP IS RUNNING BUT THE COMPRESSOR DOES NOT START	For compressor models with a slide valve: Verify that the Slide Valve has unloaded to or below the Highest Slide Valve Position to allow starting the compressor setpoint. If the slide valve has not unloaded, troubleshoot the hydraulic system. Compressor will not start until the Slide Valve is unloaded. Output 1 (MOD 1) of Digital I/O Board #1 controls the motor starter. If the motor does not start when the LED (D1) is on, check for the proper panel voltage between position 4 and 1 on the P1 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F1) and if the fuse is OK, check the output module (MOD 1). If the voltage was OK, check for the proper voltage between position 1 on the P1 DIO connector and position 18 on the terminal strip. If voltage is OK, check for the proper voltage between position 18 and 2 on the terminal strip. If the voltage is OK, check the interposing relay (By others).
COMPRESSOR AUXILIARY SHUTDOWN	Output 1 controls the Compressor Start Relay (By others). If the compressor does not start and the LED (D1) for Output 1 (MOD 1) is on, check for the proper panel voltage between position 4 and 1 on the P1 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F1) and if the fuse is OK, check the output module (MOD 1). If the voltage was OK, check for the proper voltage between position 1 on the P1 DIO connector and position 18 on the terminal strip. If voltage is OK, check for the proper voltage between position 18 and 2 on the terminal strip. If the voltage is OK, check the interposing relay (By others). The Compressor Starter Auxiliary Contacts turn on Input 2 (MOD 2) of Digital I/O Board #1 when they are closed. These contacts are located on the Compressor Starter. If the input does not turn on check if the LED (D2) is lit when it should be. If it isn't, check the fuse (F2) and if the fuse is OK, check the input module (MOD 2). Check the voltage between positions 2 and 4 of the P1 DIO connector.

* If applicable

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
OIL HEATERS DO NOT OPERATE	The oil heaters should operate only when the compressor is NOT running and the oil separator temperature is not greater than or equal to the Oil Heater Off Above setpoint, and that the Oil Level input is made. If the oil heaters do not work and the LED (D21) for Output 21 (MOD 21) is on, check for the proper panel voltage between position 4 and 1 on the P6 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F21) and if the fuse is OK, check the output module (MOD 21). If the voltage was OK, check for the proper voltage between position 1 on the P6 DIO connector and position 9 on the terminal strip. If voltage is OK, check for the proper voltage between position 9 and 2 on the terminal strip. If the voltage is OK, check the Oil Heater Relay (1CR). If the problem hasn't been located, check the circuit breaker (1CB). If the breaker is not tripped, check power into 1CB. If OK check between Wires 103 and 106. If the Oil Heater Relay (1CR) is closed, check for proper panel voltage between wires 106 and 102. If OK, check the Oil Heater.
COMPRESSOR DOES NOT LOAD and/or UNLOAD* (Compressor that steps on Capacity)	For a 4-Step compressor, verify that the 50% SV (Solenoid Valve) is energized BEFORE the 75% SV is energized. For a 3-Step compressor, verify that 75% SV is energized BEFORE the 100% SV. Feel hydraulic tubing to the compressor unloading pistons. If tubing is hot, inspect the unloader pistons for worn parts or improper seating. Check that the hydraulic valves feeding the solenoid valve as well as those feeding the unloader pistons are open. Confirm that hydraulic tubing and wiring is properly connected. Check the solenoid valve coil to see if it has been damaged. ***NOTE: Verify that the proper capacity control setpoint has been programmed.***
COMPRESSOR WILL ONLY PARTIALLY LOAD* (Compressor that steps on Capacity)	With the first SV (solenoid valve) properly energized, verify that the second SV energizes and then check the third SV if there is one for this compressor model. Check that the hydraulic valves feeding the first SV as well as those feeding the compressor unloading pistons are open. Inspect the compressor unloading ports for worn or improperly seated parts.
SLIDE VALVE DOES NOT LOAD and/or UNLOAD*	Verify that the Slide Valve is in the AUTO mode and that capacity control is calling for load and/or unload. Output 5 (MOD 5) controls the Slide Valve Load Solenoid. If LED (D5) for Output 5 (MOD 5) is on, check for the proper panel voltage between position 4 and 1 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F5) and if the fuse is OK, check the output module (MOD 5). If the voltage was OK, check for the proper voltage between position 1 on the P2 DI O connector and position 17 on the terminal strip. If voltage is OK, check for the proper voltage between position 17 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve. Output 6 (MOD 6) controls the Slide Valve Unload Solenoid. If the LED (D1) for Output 6 (MOD 6) is on, check for the proper panel voltage between position 4 and 2 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F6) and if the fuse is OK, check the output module (MOD 6). If the voltage was OK, check for the proper voltage between position 2 on the P2 DIO connector and position 16 on the terminal strip. If voltage is OK, check for the proper voltage between position 16 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve. ***NOTE: Verify that the proper capacity control setpoint has been programmed.***

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
SLIDE STOP DOES NOT INCREASE and/or DECREASE*	Verify that the Slide Stop is in the AUTO mode and that the VI Ratio is calling for a VI increase or decrease. Output 7 (MOD 7) controls Slide Stop Increase Solenoid. If the LED (D7) for Output 7 (MOD 7) is on, check for the proper panel voltage between position 4 and 5 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F7) and if the fuse is OK, check the output module (MOD 7). If the voltage was OK, check for the proper voltage between position 5 on the P2 DIO connector and position 15 on the terminal strip. If voltage is OK, check for the proper voltage between position 15 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve. Output 8 (MOD 8) controls the Slide Stop Decrease Solenoid. If the LED (D8) for Output 8 (MOD 8) is on, check for the proper panel voltage between position 4 and 6 on the P2 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F8) and if the fuse is OK, check the output module (MOD 8). If the voltage was OK check for the proper voltage between position 6 on the P2 DIO connector and position 14 on the terminal strip. If voltage is OK, check for the proper voltage between position 14 and 2 on the terminal strip. If the voltage is OK, check the solenoid valve.
LIQUID INJECTION SOLENOID DOES NOT ENERGIZE* (Liquid Injection Refrigerant Cutout - LICO)	Verify that the Liquid Injection TXV is modulating properly and not feeding excessive liquid to LICO the compressor. This solenoid SHOULD be de-energized when the compressor is off. This solenoid should be energized if the Discharge temperature equals or exceeds the "Discharge Temperature On At" setpoint for the delay time. Output 9 controls the Liquid Injection Solenoid. If the LED (D9) for Output 9 (MOD 9) is on, check for the proper panel voltage between position 4 and 1 on the P3 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F9) and if the fuse is OK, check the output module (MOD 9). If the voltage was OK, check for the proper voltage between position 1 on the P3 DIO connector and position 13 on the terminal strip. If voltage is OK, check for the proper voltage between position 13 and 2 on the terminal strip. If the voltage is OK, check the solenoid.
HI Vi LIQUID INJECTION PORT SOLENOID DOES NOT ENERGIZE*	Output 10 controls the Hi Vi Liquid Injection Port solenoid. If the LED (D10) for Output 10 (MOD 10) is on, check for the proper panel voltage between position 4 and 2 on the P3 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F10) and if the fuse is OK, check the output module (MOD 10). If the voltage was OK check for the proper voltage between position 2 on the P3 DIO connector and position 12 on the terminal strip. If voltage is OK, check for the proper voltage between position 12 and 2 on the terminal strip. If the voltage is OK, check the solenoid. NOTE: For an RXB and a GST compressor model, this output should only be on when the Compressor is running and the Vi is at 5.0.
ECONOMIZER*	Output 11 (MOD 11) controls the Economizer Solenoid Valve. If the LED (D11) for Output 11 (MOD 11) is on, check for the proper panel voltage between position 4 and 5 on the P3 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F11) and if the fuse is OK, check the output module (MOD 11). If the voltage was OK, check for the proper voltage between position 5 on the P3 DIO connector and position 11 on the terminal strip. If voltage is OK, check for the proper voltage between position 11 and 2 on the terminal strip. If the voltage is OK, check the solenoid. **NOTE: The economizer output will be on based on the Economizer On/Off setpoint.**
ALARM CIRCUIT DOES NOT ENERGIZE	Output 22 (MOD 22) controls the Alarm Circuit. The Alarm should turn on only when there is a warning or shutdown. If the Alarm does not occur when these conditions are found and the LED (D22) for Output 22 (MOD 22) is off, check for the proper panel voltage between position 4 and 2 on the P6 DIO connector on Digital I/O board #1. If the proper voltage is not found, check the fuse (F22) and if the fuse is OK, check the output module (MOD 22). If the voltage was OK, check for the proper voltage between position 2 on the P6 DIO connector and position 21 on the terminal strip.

SYMPTOM	PROBABLE CAUSES and CORRECTIONS
CONTROL PANEL DOES NOT RESPOND TO REMOTE CONTROL SIGNALS	Digital I/O Board 2, Inputs 3 through 5 can be used to operate the compressor from a remote location. NOTE: Check the Operating display to verify that the compressor and the Slide Valve are in REMOTE I/O. If the Input 3 (MOD 3) does not turn on, check if the LED (D3) is lit when it should be. If it isn't, check the fuse (F3) and if the fuse is OK, check the input module (MOD 3). If the Input 4 (MOD 4) does not turn on, check if the LED (D4) is lit when it should be. If it isn't, check the fuse (F4) and if the fuse is OK, check the input module (MOD 4). If the Input 5 (MOD 5) does not turn on, check if the LED (D5) is lit when it should be. If it isn't, check the fuse (F5) and if the fuse is OK, check the input module (MOD 5).
MOTOR LOAD CONTROL(FORCED UNLOAD) OCCURS AT HIGH MOTOR AMPS	The current transformer is used to convert the AC motor amps to a DC voltage signal for the microprocessor. If the %FLA reading from the Operating display is incorrect, contact the Frick© Service Department.
PRESSURES ON THE OPERATING SCREEN DO NOT APPEAR CORRECT	1st – Check the range and sensor type in the setup of the panel. If this is correct: 2nd – Open transducers that can be isolated from the system and opened to atmosphere, these would be Suction, Oil and Filter (if present). Set these transducers to 0g pressure or atmospheric pressure if your readings are in absolute. Close the transducers from atmosphere and reopen to the system/package. After these pressures have settled down, set the Discharge to match the Oil pressure. **NOTE: Reference the Pressure Transducer Conversion Data Chart.**
COMPRESSOR WITH SLIDE VALVE DOES NOT AUTOMATICALLY LOAD OR UNLOAD*	Verify that the Slide Valve Mode [AUTO] has been set and AUTO appears under Slide Valve Mode on the Home Status screen. If the problem persists, see the Troubleshooting section SLIDE VALVE DOES NOT LOAD and/or UNLOAD.
COMPRESSOR THAT STEPS ON CAPACITY DOES NOT AUTOMATICALLY LOAD OR UNLOAD*	Verify that the Capacity Mode **[AUTO]** has been set and AUTO appears under Capacity Mode on the Home screen. If the problem persists, see the Troubleshooting section COMPRESSOR DOES NOT LOAD and/or UNLOAD.

NOTES

SECTION 9

QUANTUM™ HD DRAWINGS

This table lists the numbers for the drawings that appear on the following pages. The drawings shown here are the latest revision as of the printing of this manual. These drawings appear here for reference purposes only, and are subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Table 15. Quantum HD Drawings List

Wiring Diagrams	Page	Drawing Number
HD Panel Center Assembly	66 - 69	649D5922 Rev. D
RXF With Capacity Slide Transmitter	70 - 75	649D5943 Rev. -
RWFII With Capacity Slide Transmitter	76 – 81	649D5944 Rev. -
RXF / RXB With Capacity Slide Potentiometer	82 – 87	649D5945 Rev. -
RWBII With Capacity Slide Potentiometer	88 – 93	649D5946 Rev. -
RDB	94 - 99	649D5947 Rev. -
PhD for 32 channel Analog Board	100	649D5050 Rev. D
Digital I/O Board 2	101 - 102	649D5948 Rev. -
Analog I/O Board 2	103 – 104	649D5949 Rev. -
Other Drawings	**Page**	**Drawing Number**
DC Power and Communications Harness	105	639D0204 Rev. A
AC I/O Harness for Digital Boards 1 and 2	106	639D0203 Rev. -
Isolater Repeater Module (Isolates Communications Signals)	107	639C0133 Rev. A
Communications Wiring Diagrams	108	N/A
Point-to-Point Field Wiring Diagram	109	N/A
Vyper (up to 565 amps) to Q5 HD Wiring Connections	Contact Frick Service	649D6002 Rev. -
Vyper (over 565 amps) to Q5 HD Wiring Connections	Contact Frick Service	649D6003 Rev. -
Enhancer to Q5 HD Wiring Connections	Contact Frick Service	649D6004 Rev. -

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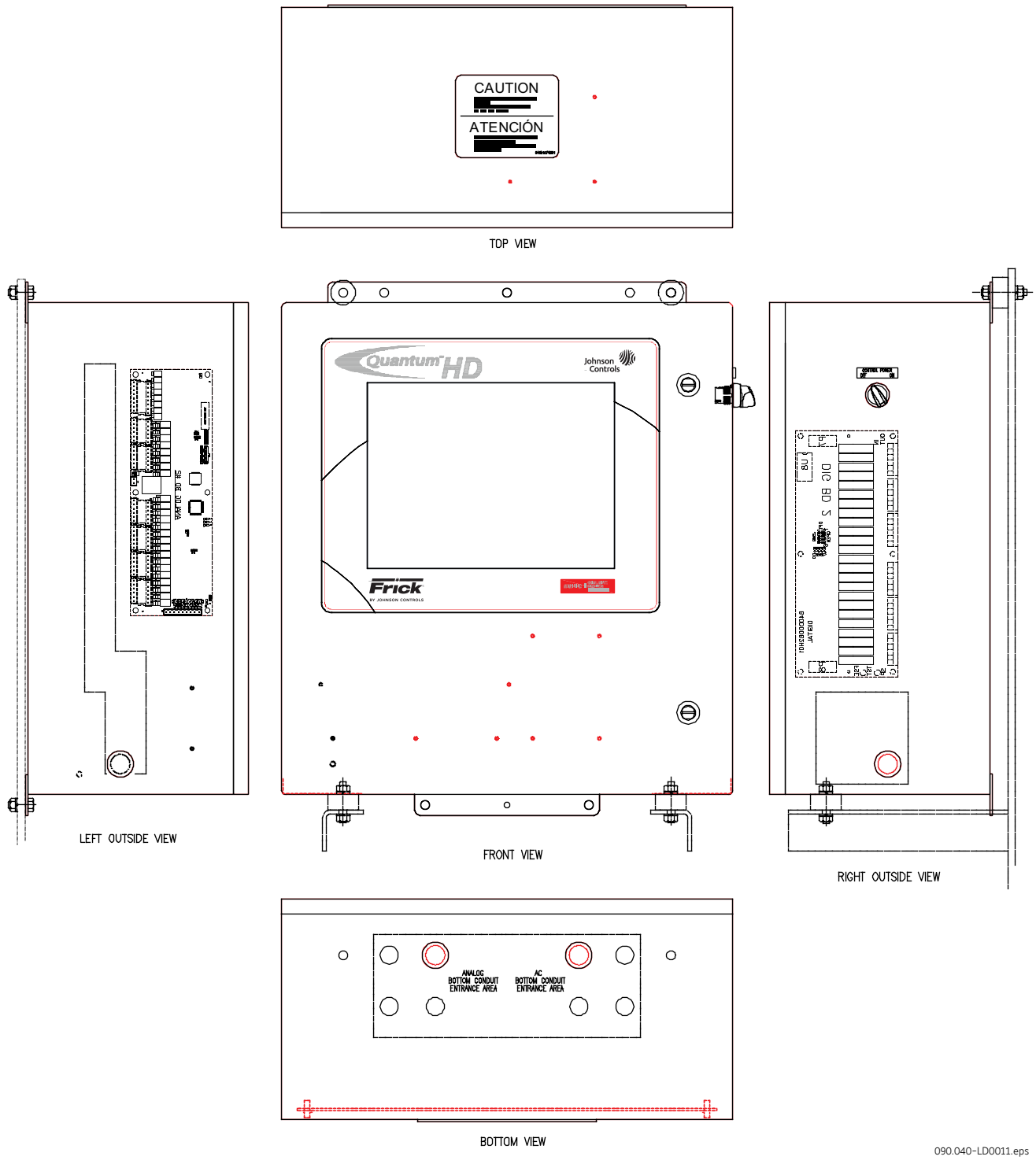
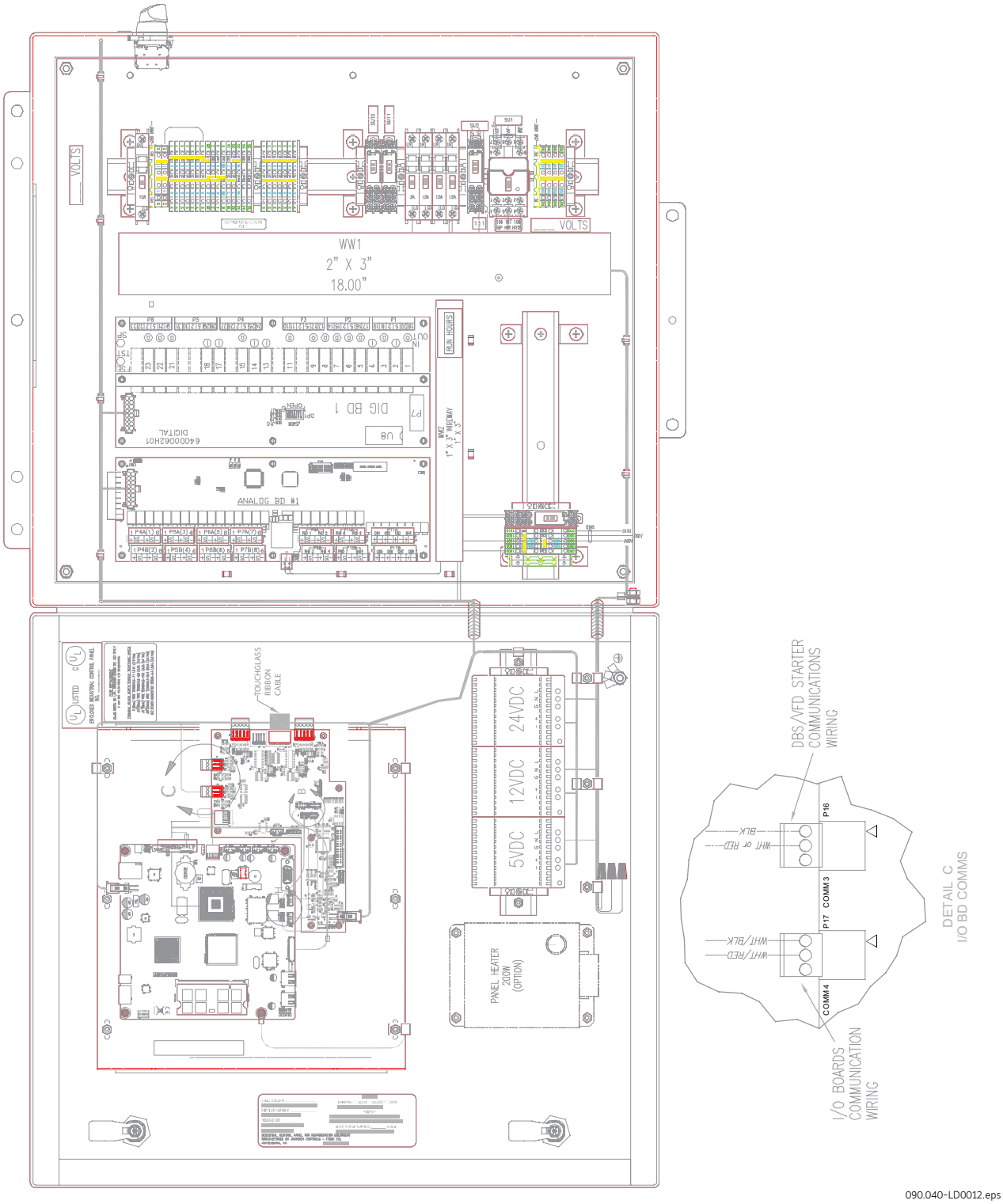


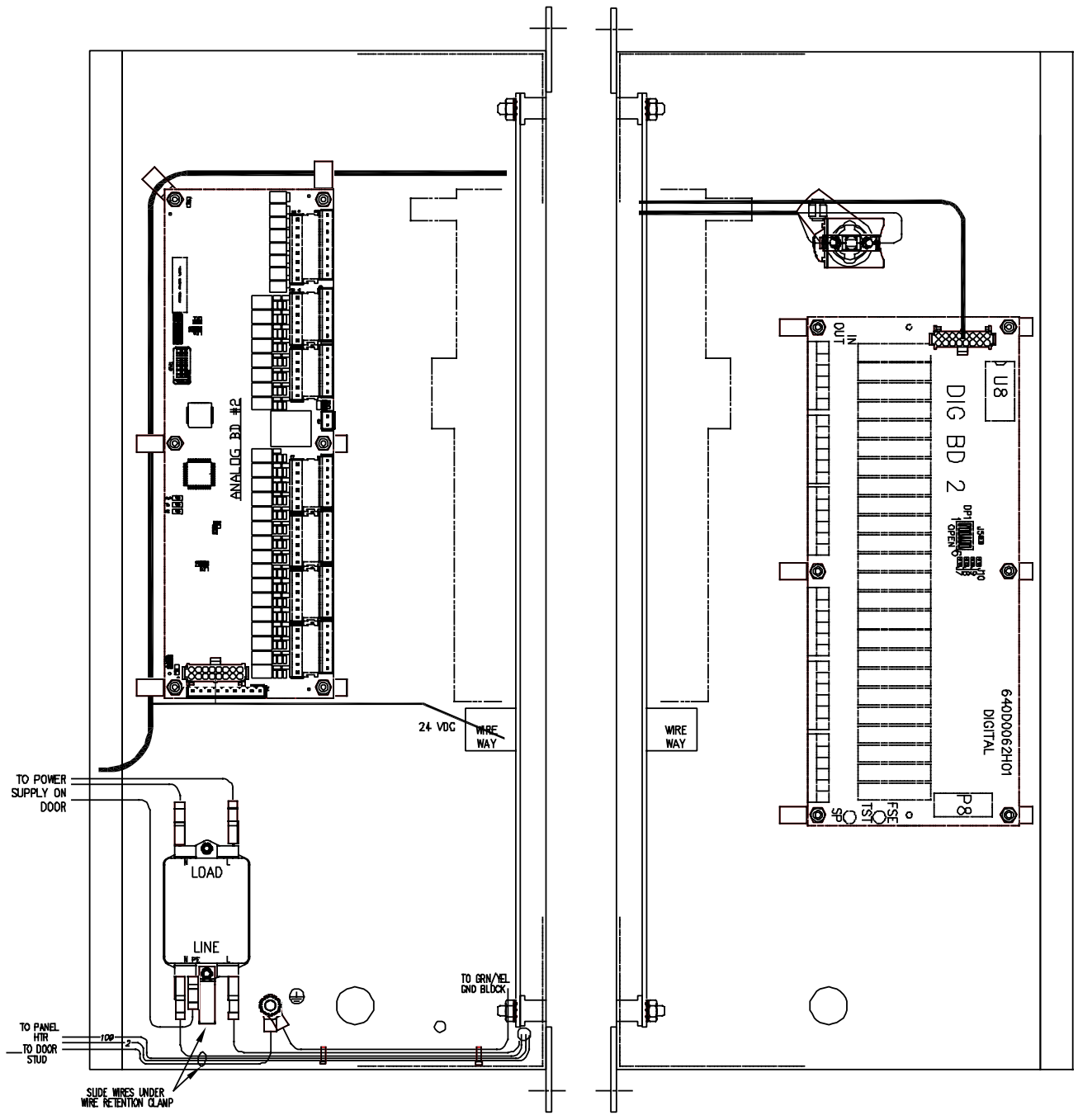
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 24. Quantum HD Panel Assembly (1/4)



This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 24a. Quantum HD Panel Assembly (2/4)



SECTION G-G
INSIDE LEFT OF ENCLOSURE

SECTION F-F
INSIDE RIGHT OF ENCLOSURE

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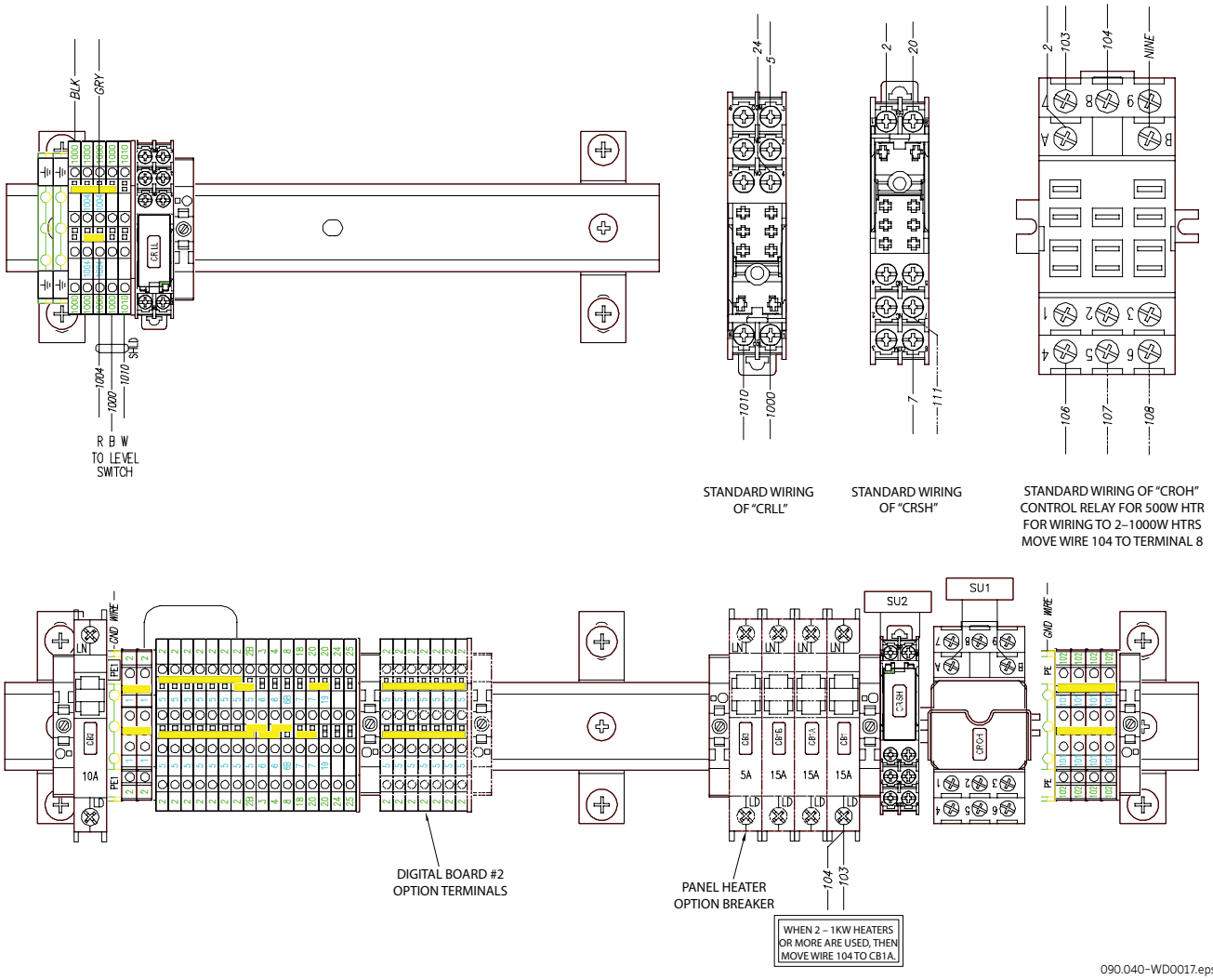
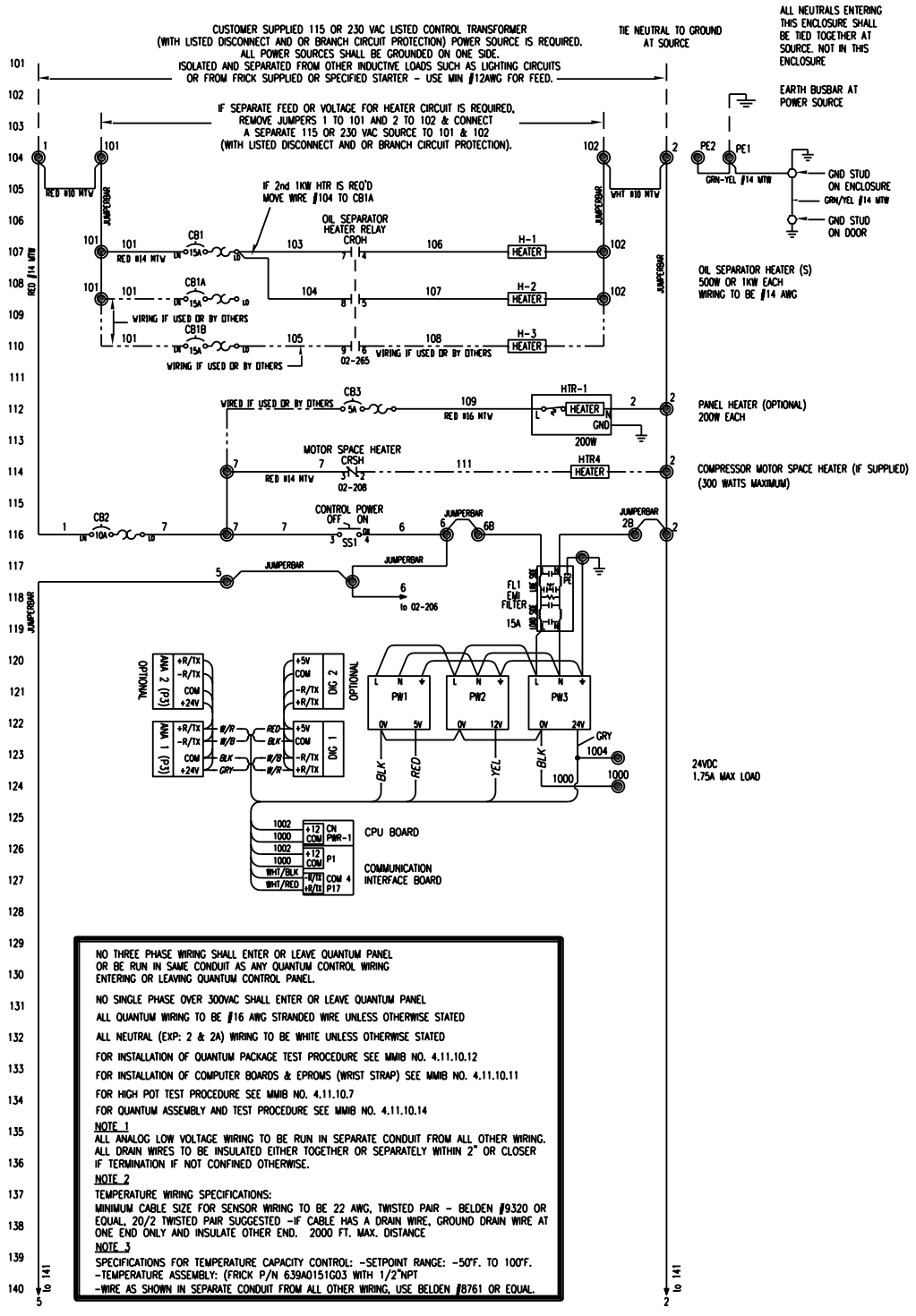
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 24b. Quantum HD Panel Assembly (3/4)



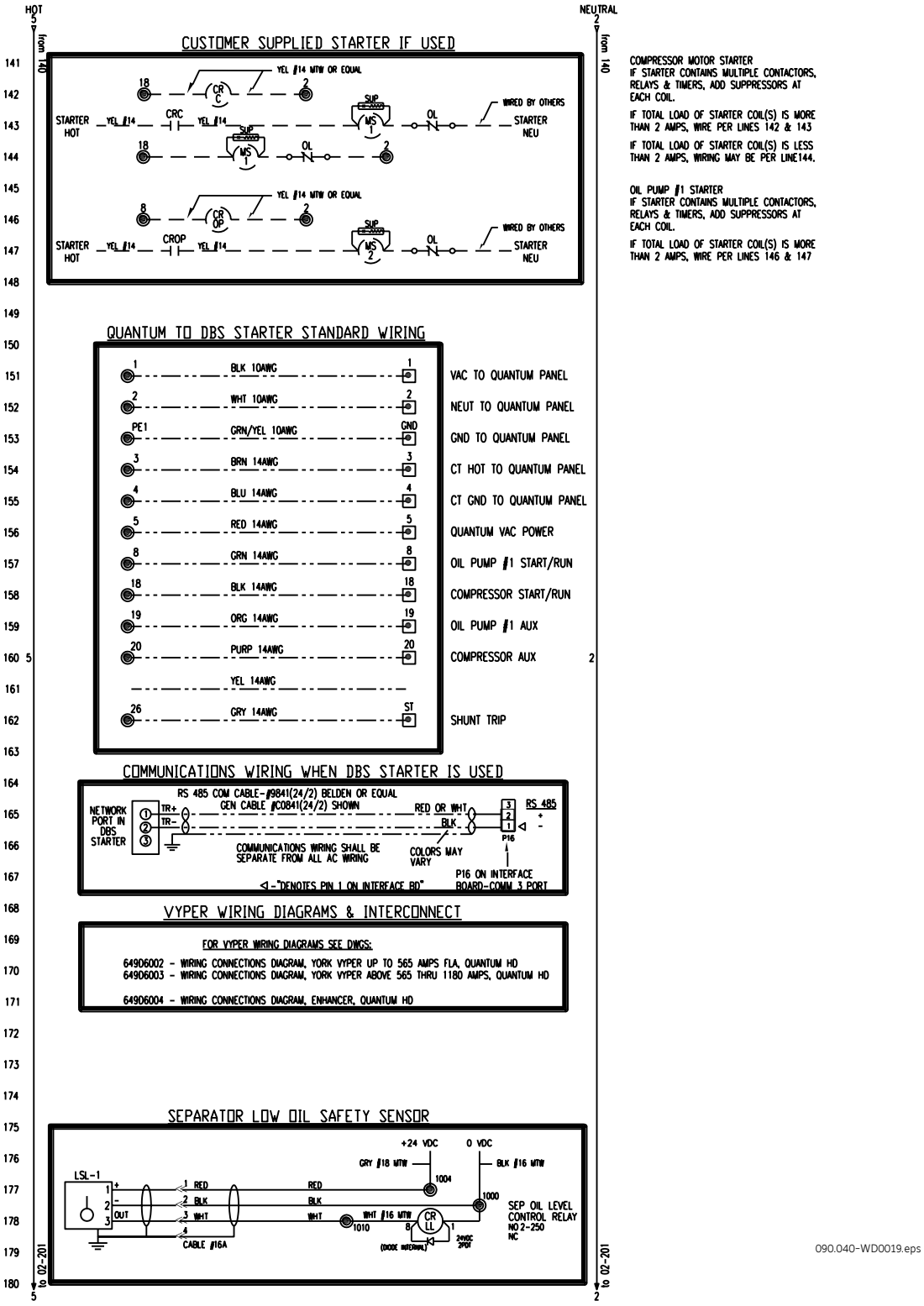
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 24c. Quantum HD Panel Assembly (4/4)


CUSTOMER SUPPLIED 115 OR 230 VAC LISTED CONTROL TRANSFORMER
(WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION) POWER SOURCE IS REQUIRED.
ALL POWER SOURCES SHALL BE GROUNDED ON ONE SIDE.
ISOLATED AND SEPARATED FROM OTHER INDUCTIVE LOADS SUCH AS LIGHTING CIRCUITS
OR FROM FRICK SUPPLIED OR SPECIFIED STARTER - USE MIN #12AWG FOR FEED.
TIE NEUTRAL TO GROUND AT SOURCE
ALL NEUTRALS ENTERING THIS ENCLOSURE SHALL BE TIED TOGETHER AT SOURCE. NOT IN THIS ENCLOSURE
EARTH BUSBAR AT POWER SOURCE
IF SEPARATE FEED OR VOLTAGE FOR HEATER CIRCUIT IS REQUIRED, REMOVE JUMPERS 1 TO 101 AND 2 TO 102 & CONNECT A SEPARATE 115 OR 230 VAC SOURCE TO 101 & 102 (WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION).
IF 2nd 1KW HTR IS REQ'D MOVE WIRE #104 TO CB1A
OIL SEPARATOR HEATER RELAY
CROH
CB1
CB1A
CB1B
H-1 HEATER
H-2 HEATER
H-3 HEATER
OIL SEPARATOR HEATER (S) 500W OR 1KW EACH WIRING TO BE #14 AWG
GND STUD ON ENCLOSURE
GND STUD ON DOOR
CB3
HTR-1 HEATER 200W
PANEL HEATER (OPTIONAL) 200W EACH
MOTOR SPACE HEATER
CRSH
HTR4 HEATER
COMPRESSOR MOTOR SPACE HEATER (IF SUPPLIED) (300 WATTS MAXIMUM)
CB2
CONTROL POWER OFF ON
SS1
FL1 EMI FILTER 15A
PW1
PW2
PW3
24VDC 1.75A MAX LOAD
CPU BOARD
COMMUNICATION INTERFACE BOARD
NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM CONTROL PANEL.
NO SINGLE PHASE OVER 300VAC SHALL ENTER OR LEAVE QUANTUM PANEL
ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS OTHERWISE STATED
ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS OTHERWISE STATED
FOR INSTALLATION OF QUANTUM PACKAGE TEST PROCEDURE SEE MMIB NO. 4.11.10.12
FOR INSTALLATION OF COMPUTER BOARDS & EPROMS (WRIST STRAP) SEE MMIB NO. 4.11.10.11
FOR HIGH POT TEST PROCEDURE SEE MMIB NO. 4.11.10.7
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE SEE MMIB NO. 4.11.10.14
NOTE 1
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER IF TERMINATION IF NOT CONFINED OTHERWISE.
NOTE 2
TEMPERATURE WIRING SPECIFICATIONS:
MINIMUM CABLE SIZE FOR SENSOR WIRING TO BE 22 AWG, TWISTED PAIR - BELDEN #9320 OR EQUAL. 20/2 TWISTED PAIR SUGGESTED -IF CABLE HAS A DRAIN WIRE, GROUND DRAIN WIRE AT ONE END ONLY AND INSULATE OTHER END. 2000 FT. MAX. DISTANCE
NOTE 3
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL: -SETPOINT RANGE: -50°F. TO 100°F.
-TEMPERATURE ASSEMBLY: (FRICK P/N 639A0151G03 WITH 1/2"NPT
-WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING, USE BELDEN #8761 OR EQUAL.
090.040-WD0018.eps

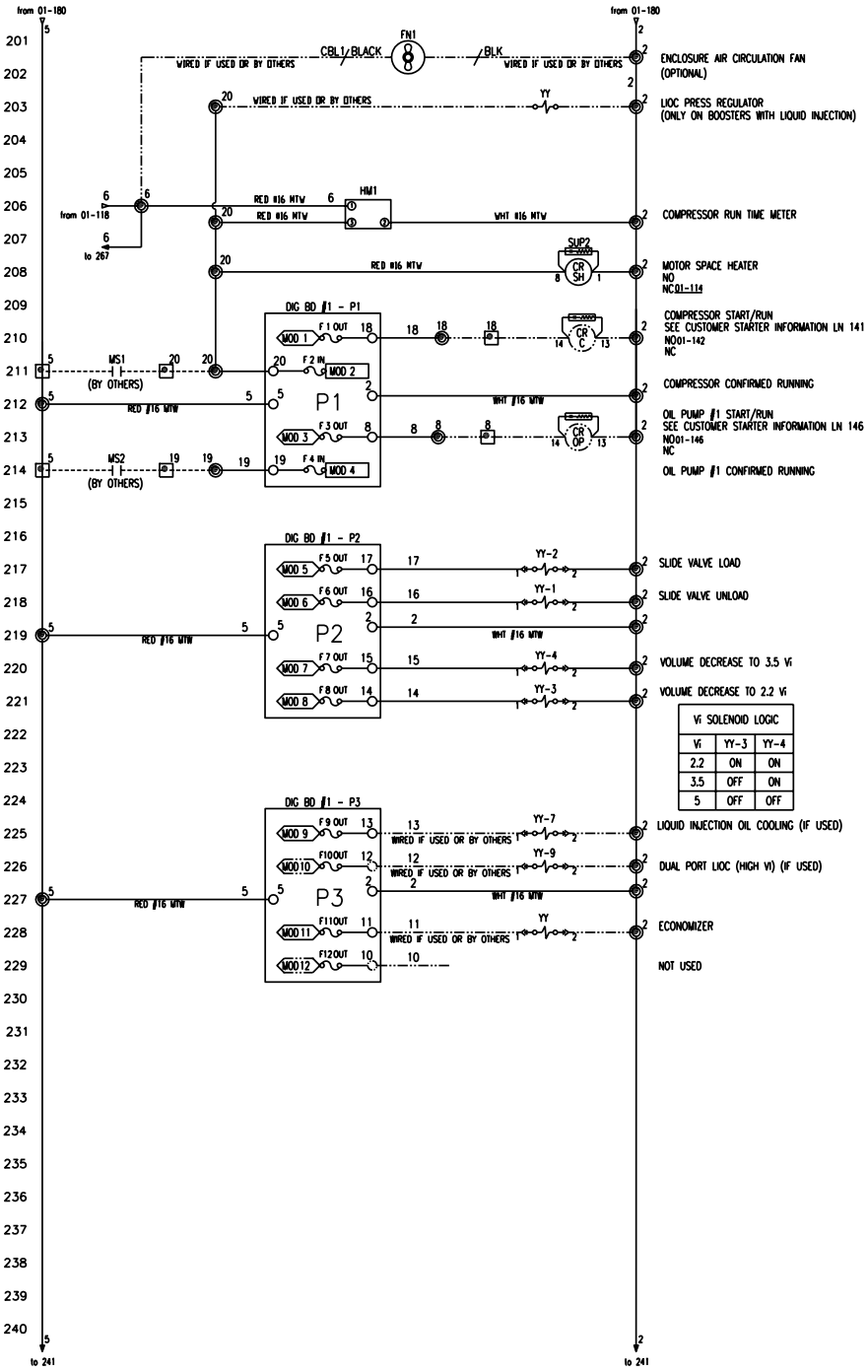
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 25. RXF Wiring Diagram (Capacity Slide Transmitter) (1/6)


HOT
NEUTRAL
CUSTOMER SUPPLIED STARTER IF USED
COMPRESSOR MOTOR STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 142 & 143
IF TOTAL LOAD OF STARTER COIL(S) IS LESS THAN 2 AMPS, WIRING MAY BE PER LINE144.
OIL PUMP #1 STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 146 & 147
YEL #14 MTW OR EQUAL
WIRED BY OTHERS
STARTER HOT
STARTER NEU
QUANTUM TO DBS STARTER STANDARD WIRING
BLK 10AWG
WHT 10AWG
GRN/YEL 10AWG
BRN 14AWG
BLU 14AWG
RED 14AWG
GRN 14AWG
BLK 14AWG
ORG 14AWG
PURP 14AWG
YEL 14AWG
GRY 14AWG
VAC TO QUANTUM PANEL
NEUT TO QUANTUM PANEL
GND TO QUANTUM PANEL
CT HOT TO QUANTUM PANEL
CT GND TO QUANTUM PANEL
QUANTUM VAC POWER
OIL PUMP #1 START/RUN
COMPRESSOR START/RUN
OIL PUMP #1 AUX
COMPRESSOR AUX
SHUNT TRIP
COMMUNICATIONS WIRING WHEN DBS STARTER IS USED
RS 485 COM CABLE-#9841(24/2) BELDEN OR EQUAL
GEN CABLE #C0841(24/2) SHOWN
NETWORK PORT IN DBS STARTER
TR+
TR-
RED OR WHT
BLK
RS 485
COLORS MAY VARY
COMMUNICATIONS WIRING SHALL BE SEPARATE FROM ALL AC WIRING
◁-"DENOTES PIN 1 ON INTERFACE BD"
P16 ON INTERFACE BOARD-COMM 3 PORT
VYPER WIRING DIAGRAMS & INTERCONNECT
FOR VYPER WIRING DIAGRAMS SEE DWGS:
64906002 - WIRING CONNECTIONS DIAGRAM, YORK VYPER UP TO 565 AMPS FLA, QUANTUM HD
64906003 - WIRING CONNECTIONS DIAGRAM, YORK VYPER ABOVE 565 THRU 1180 AMPS, QUANTUM HD
64906004 - WIRING CONNECTIONS DIAGRAM, ENHANCER, QUANTUM HD
SEPARATOR LOW OIL SAFETY SENSOR
LSL-1
CABLE #16A
+24 VDC
0 VDC
GRY #18 MTW
BLK #16 MTW
SEP OIL LEVEL CONTROL RELAY
NO 2-250
NC
24VDC 2POT
(DIODE INTERNAL)
to 02-201
090.040-WD0019.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 25a. RXF Wiring Diagram (Capacity Slide Transmitter) (2/6)



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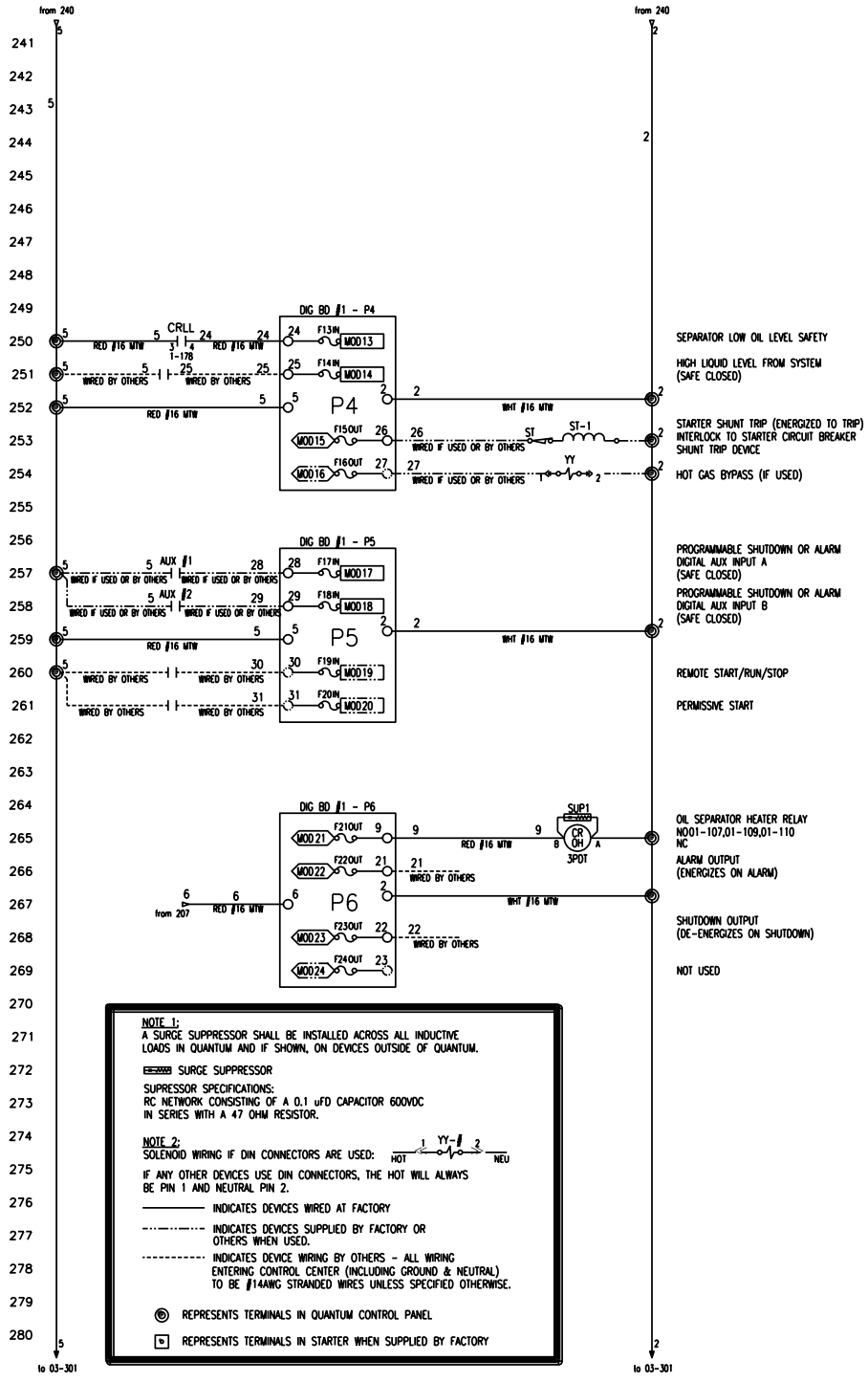
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

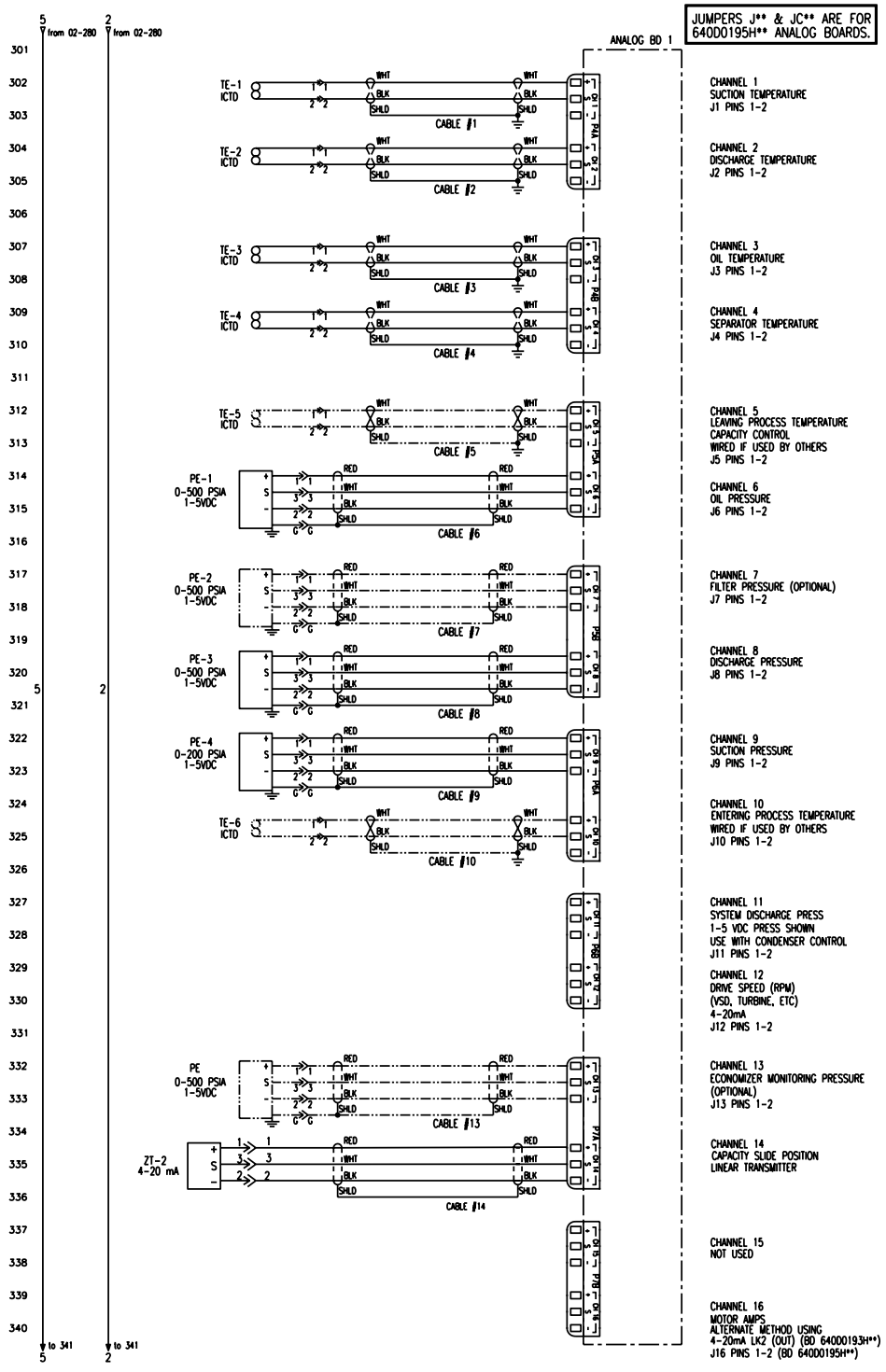
Figure 25b. RXF Wiring Diagram (Capacity Slide Transmitter) (3/6)



090.040-WD0021.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

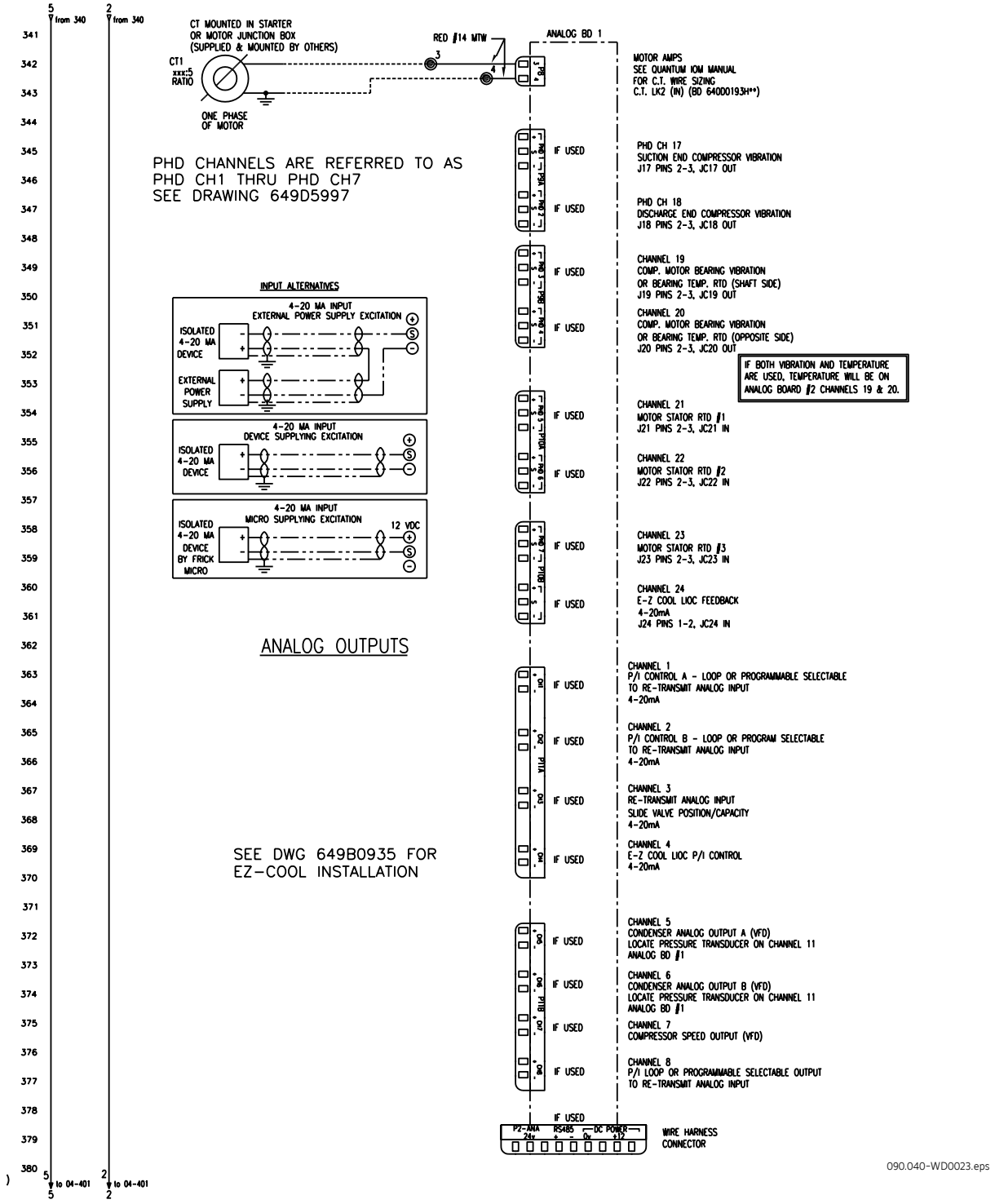
Figure 25c. RXF Wiring Diagram (Capacity Slide Transmitter)(4/6)



090.040-WD0022.eps

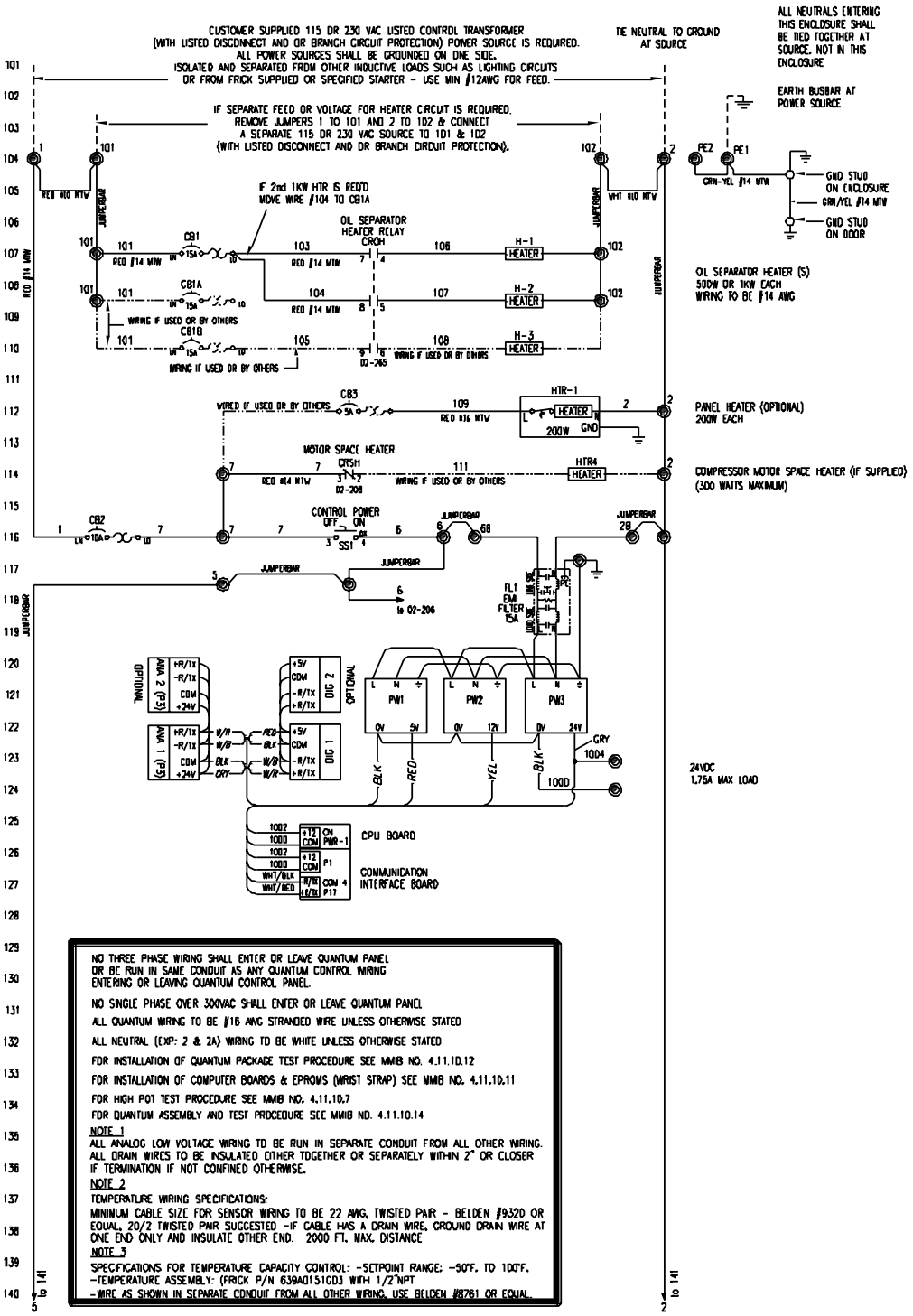
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 25d. RXF Wiring Diagram (Capacity Slide Transmitter) (5/6)



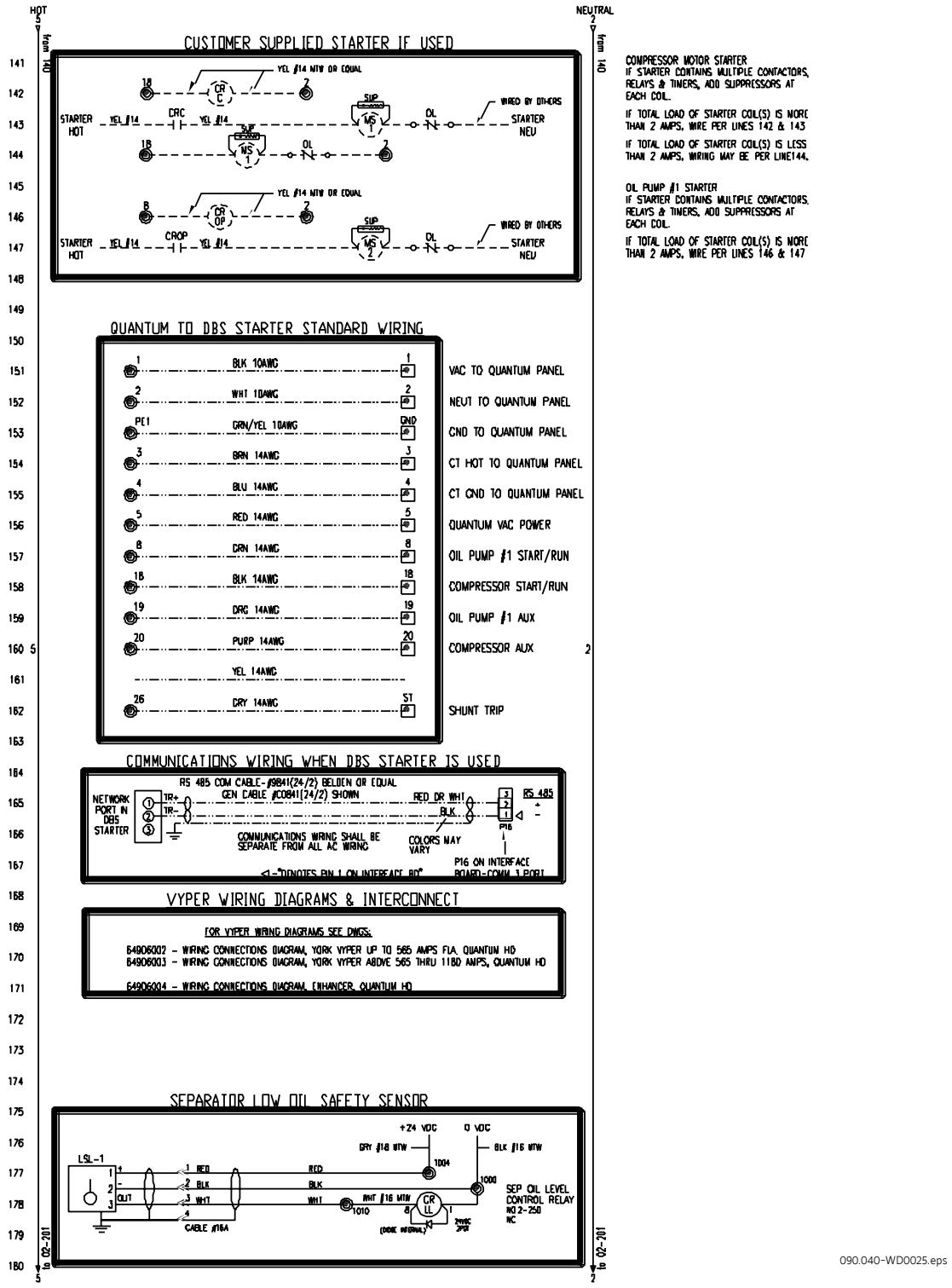
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 25e. RXF Wiring Diagram (Capacity Slide Transmitter) (6/6)


CUSTOMER SUPPLIED 115 OR 230 VAC LISTED CONTROL TRANSFORMER
(WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION) POWER SOURCE IS REQUIRED.
ALL POWER SOURCES SHALL BE GROUNDED ON ONE SIDE.
ISOLATED AND SEPARATED FROM OTHER INDUCTIVE LOADS SUCH AS LIGHTING CIRCUITS
OR FROM FRICK SUPPLIED OR SPECIFIED STARTER - USE MIN #12AWG FOR FEED.
TIE NEUTRAL TO GROUND AT SOURCE
ALL NEUTRALS ENTERING THIS ENCLOSURE SHALL BE TIED TOGETHER AT SOURCE. NOT IN THIS ENCLOSURE
EARTH BUSBAR AT POWER SOURCE
IF SEPARATE FEED OR VOLTAGE FOR HEATER CIRCUIT IS REQUIRED. REMOVE JUMPERS 1 TO 101 AND 2 TO 102 & CONNECT A SEPARATE 115 OR 230 VAC SOURCE TO 101 & 102 (WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION).
GND STUD ON ENCLOSURE
GRN/YEL #14 MTW
GND STUD ON DOOR
IF 2nd 1KW HTR IS REQ'D MOVE WIRE #104 TO CB1A
OIL SEPARATOR HEATER RELAY CR2H
OIL SEPARATOR HEATER (S) 500W OR 1KW EACH WIRING TO BE #14 AWG
WIRING IF USED OR BY OTHERS
PANEL HEATER (OPTIONAL) 200W EACH
MOTOR SPACE HEATER
CR5H
COMPRESSOR MOTOR SPACE HEATER (IF SUPPLIED) (300 WATTS MAXIMUM)
CONTROL POWER OFF ON
JUMPERBAR
FL1 EMI FILTER 15A
ANA 2 (P3)
ANA 1 (P2)
DIG 2
DIG 1
OPTIONAL
PW1
PW2
PW3
24VDC 1.75A MAX LOAD
CPU BOARD
COMMUNICATION INTERFACE BOARD
NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM CONTROL PANEL.
NO SINGLE PHASE OVER 300VAC SHALL ENTER OR LEAVE QUANTUM PANEL
ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS OTHERWISE STATED
ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS OTHERWISE STATED
FOR INSTALLATION OF QUANTUM PACKAGE TEST PROCEDURE SEE MMB NO. 4.11.10.12
FOR INSTALLATION OF COMPUTER BOARDS & EPROMS (WRIST STRAP) SEE MMB NO. 4.11.10.11
FOR HIGH POT TEST PROCEDURE SEE MMB NO. 4.11.10.7
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE SEE MMB NO. 4.11.10.14
NOTE 1
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER IF TERMINATION IF NOT CONFINED OTHERWISE.
NOTE 2
TEMPERATURE WIRING SPECIFICATIONS:
MINIMUM CABLE SIZE FOR SENSOR WIRING TO BE 22 AWG, TWISTED PAIR - BELDEN #9320 OR EQUAL. 20/2 TWISTED PAIR SUGGESTED -IF CABLE HAS A DRAIN WIRE, GROUND DRAIN WIRE AT ONE END ONLY AND INSULATE OTHER END. 2000 FT. MAX. DISTANCE
NOTE 3
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL: -SETPOINT RANGE: -50°F. TO 100°F.
-TEMPERATURE ASSEMBLY: (FRICK P/N 639A0151GD3 WITH 1/2"NPT
-WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. USE BELDEN #8761 OR EQUAL.
090.040-WD0024.eps

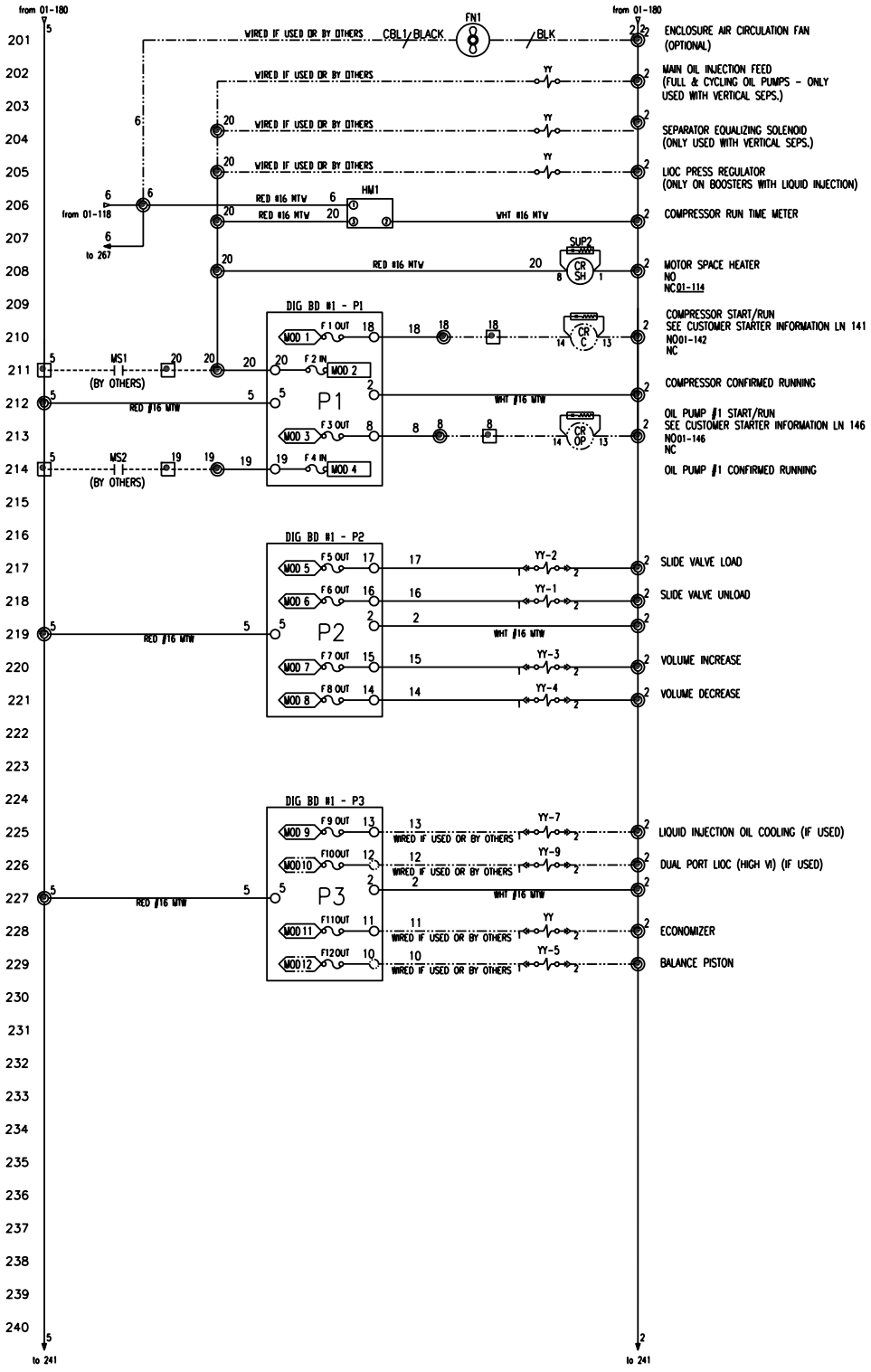
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 26. RWFII Wiring Diagram (Capacity Slide Transmitter) (1/6)


HOT
NEUTRAL
CUSTOMER SUPPLIED STARTER IF USED
COMPRESSOR MOTOR STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 142 & 143
IF TOTAL LOAD OF STARTER COIL(S) IS LESS THAN 2 AMPS, WIRING MAY BE PER LINE144.
OIL PUMP #1 STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 146 & 147
YEL #14 MTW OR EQUAL
WIRED BY OTHERS
STARTER HOT
STARTER NEU
QUANTUM TO DBS STARTER STANDARD WIRING
BLK 10AWG
VAC TO QUANTUM PANEL
WHT 10AWG
NEUT TO QUANTUM PANEL
GRN/YEL 10AWG
GND TO QUANTUM PANEL
BRN 14AWG
CT HOT TO QUANTUM PANEL
BLU 14AWG
CT GND TO QUANTUM PANEL
RED 14AWG
QUANTUM VAC POWER
GRN 14AWG
OIL PUMP #1 START/RUN
BLK 14AWG
COMPRESSOR START/RUN
ORG 14AWG
OIL PUMP #1 AUX
PURP 14AWG
COMPRESSOR AUX
YEL 14AWG
GRY 14AWG
SHUNT TRIP
COMMUNICATIONS WIRING WHEN DBS STARTER IS USED
RS 485 COM CABLE-#9841(24/2) BELDEN OR EQUAL
GEN CABLE #C0841(24/2) SHOWN
NETWORK PORT IN DBS STARTER
COMMUNICATIONS WIRING SHALL BE SEPARATE FROM ALL AC WIRING
COLORS MAY VARY
P16 ON INTERFACE BOARD-COMM 3 PORT
VYPER WIRING DIAGRAMS & INTERCONNECT
FOR VYPER WIRING DIAGRAMS SEE DWGS:
64906002 - WIRING CONNECTIONS DIAGRAM, YORK VYPER UP TO 565 AMPS FLA, QUANTUM HD
64906003 - WIRING CONNECTIONS DIAGRAM, YORK VYPER ABOVE 565 THRU 1180 AMPS, QUANTUM HD
64906004 - WIRING CONNECTIONS DIAGRAM, ENHANCER, QUANTUM HD
SEPARATOR LOW OIL SAFETY SENSOR
+24 VDC
0 VDC
SEP OIL LEVEL CONTROL RELAY
CABLE #16A
to 02-201
090.040-WD0025.eps

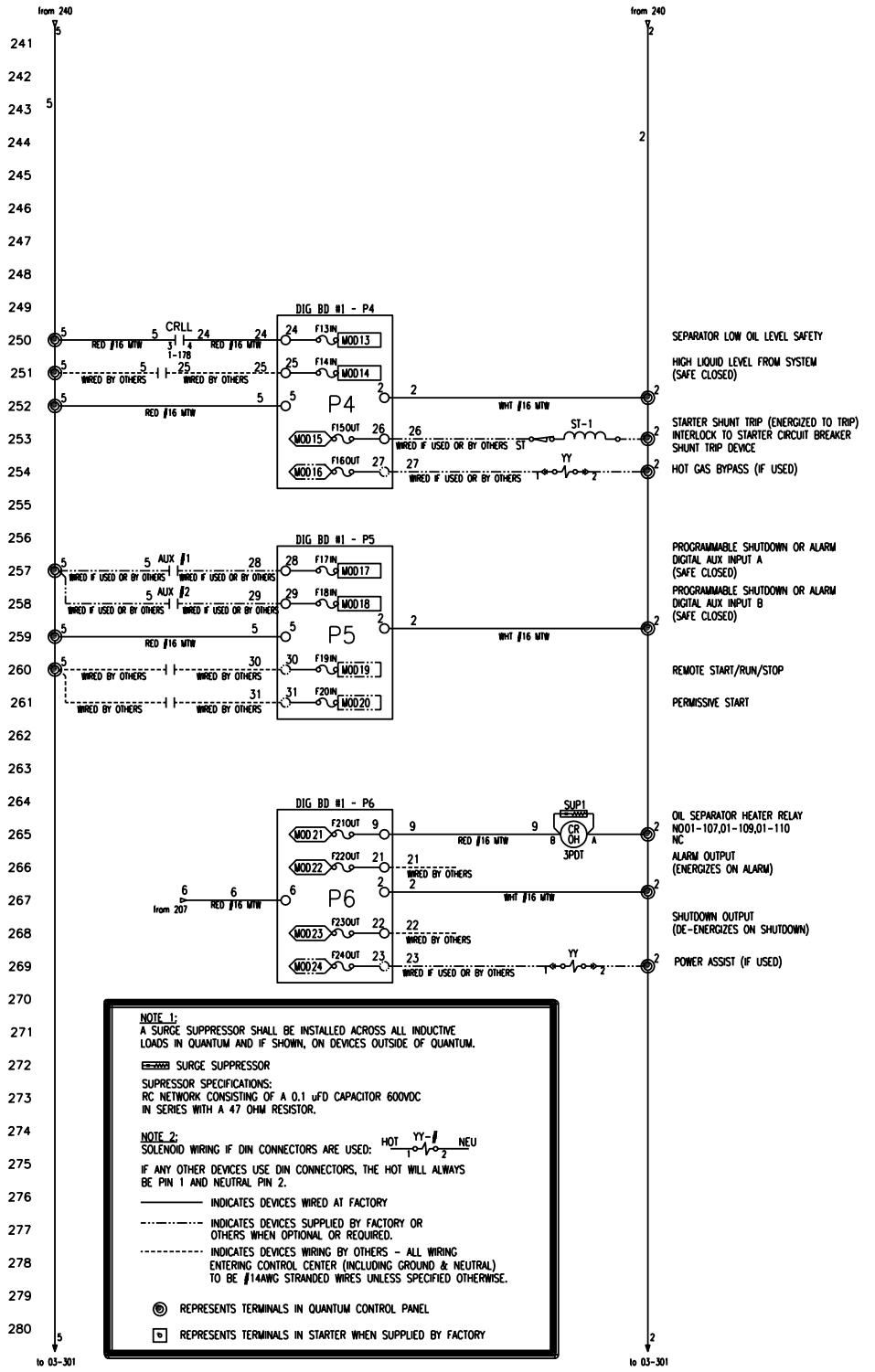
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 26a. RWFII Wiring Diagram (Capacity Slide Transmitter) (2/6)



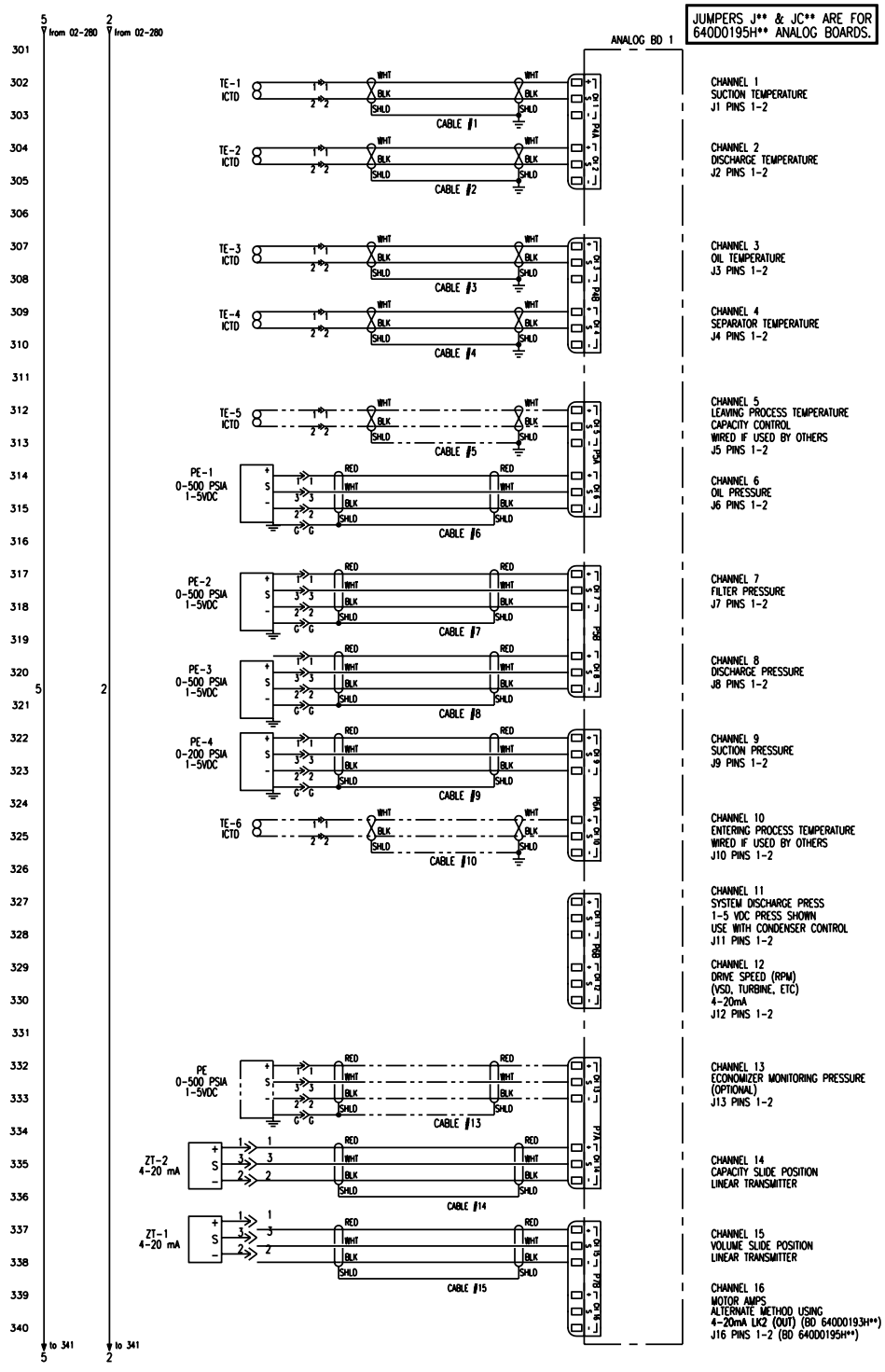
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 26b. Wiring Diagram – RWFII with Capacity Slide Transmitter (3/6)


from 240
from 240
DIG BD #1 - P4
DIG BD #1 - P5
DIG BD #1 - P6
CRLL
1-178
P4
P5
P6
SEPARATOR LOW OIL LEVEL SAFETY
HIGH LIQUID LEVEL FROM SYSTEM (SAFE CLOSED)
STARTER SHUNT TRIP (ENERGIZED TO TRIP) INTERLOCK TO STARTER CIRCUIT BREAKER SHUNT TRIP DEVICE
HOT GAS BYPASS (IF USED)
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT A (SAFE CLOSED)
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT B (SAFE CLOSED)
REMOTE START/RUN/STOP
PERMISSIVE START
OIL SEPARATOR HEATER RELAY NO01-107,01-109,01-110 NC
ALARM OUTPUT (ENERGIZES ON ALARM)
SHUTDOWN OUTPUT (DE-ENERGIZES ON SHUTDOWN)
POWER ASSIST (IF USED)
3POT
from 207
to 03-301
to 03-301
NOTE 1:
A SURGE SUPPRESSOR SHALL BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.
SURGE SUPPRESSOR
SUPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A 0.1 uFD CAPACITOR 600VDC IN SERIES WITH A 47 OHM RESISTOR.
NOTE 2:
SOLENOID WIRING IF DIN CONNECTORS ARE USED:
HOT
NEU
IF ANY OTHER DEVICES USE DIN CONNECTORS, THE HOT WILL ALWAYS BE PIN 1 AND NEUTRAL PIN 2.
INDICATES DEVICES WIRED AT FACTORY
INDICATES DEVICES SUPPLIED BY FACTORY OR OTHERS WHEN OPTIONAL OR REQUIRED.
INDICATES DEVICES WIRING BY OTHERS - ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.
REPRESENTS TERMINALS IN QUANTUM CONTROL PANEL
REPRESENTS TERMINALS IN STARTER WHEN SUPPLIED BY FACTORY
090.040-WD0027.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

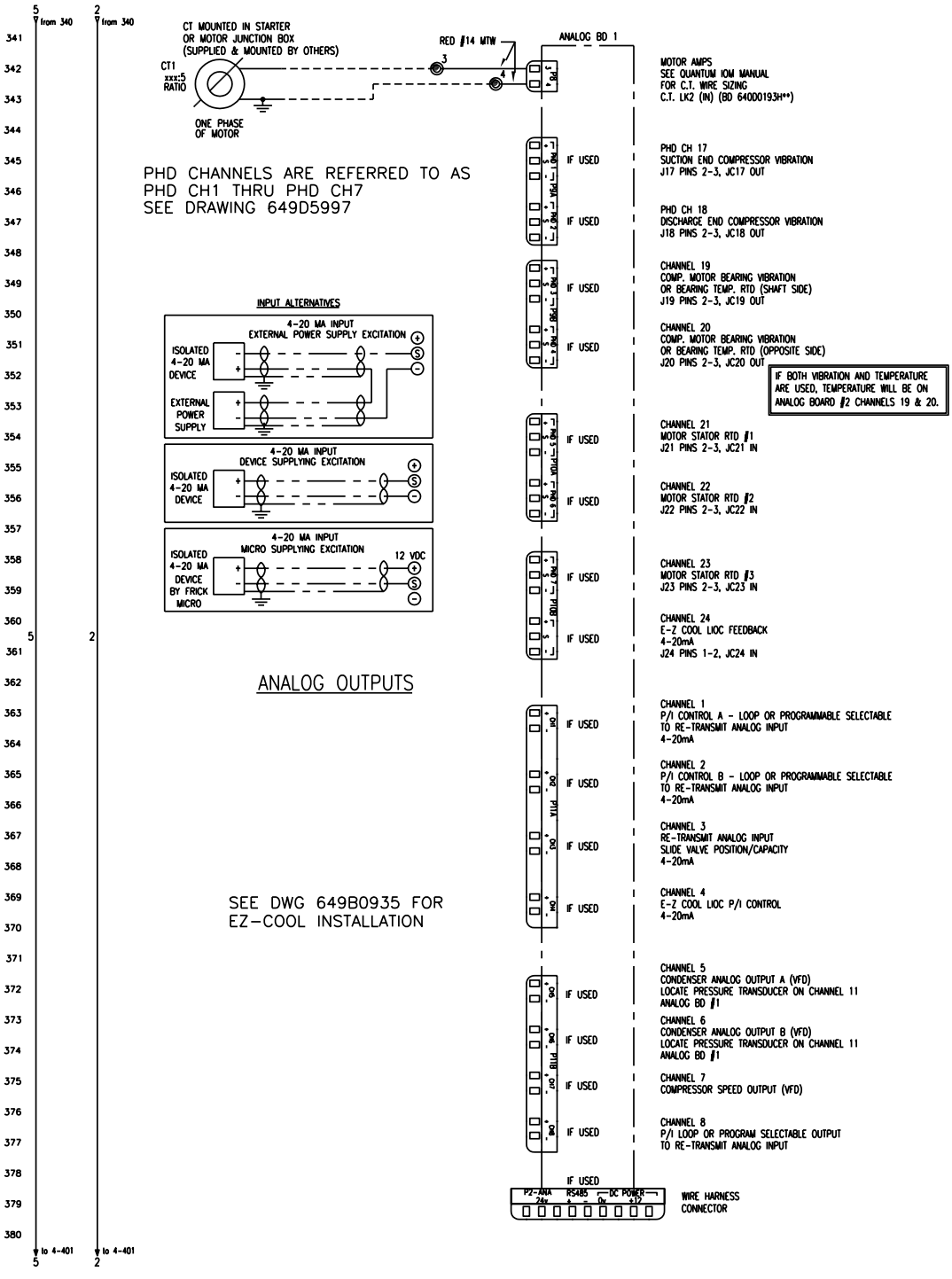
Figure 26c. Wiring Diagram – RWFII with Capacity Slide Transmitter (4/6)



090.040-WD0028.eps

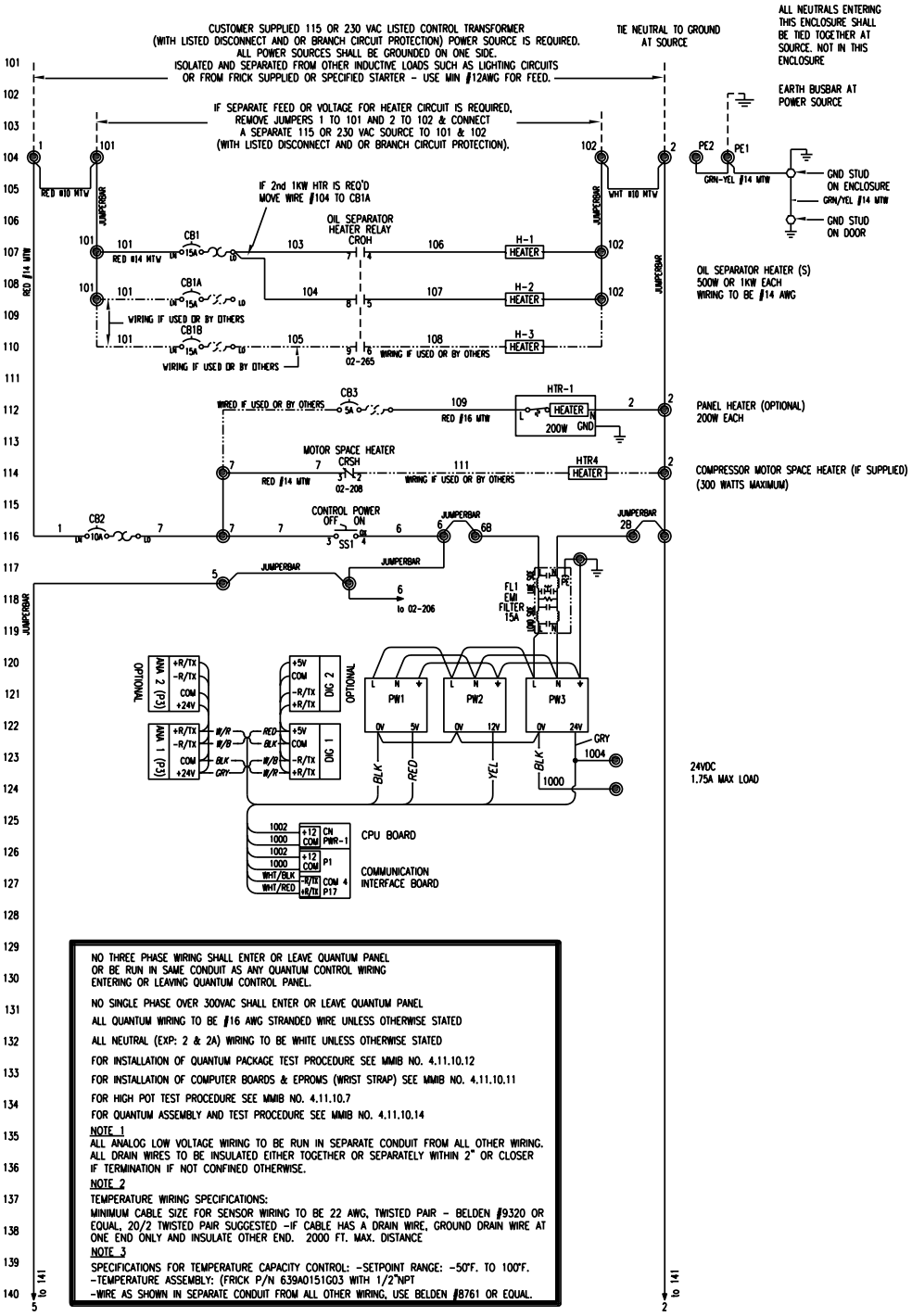
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 26d. Wiring Diagram – RWFII with Capacity Slide Transmitter (5/6)



This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

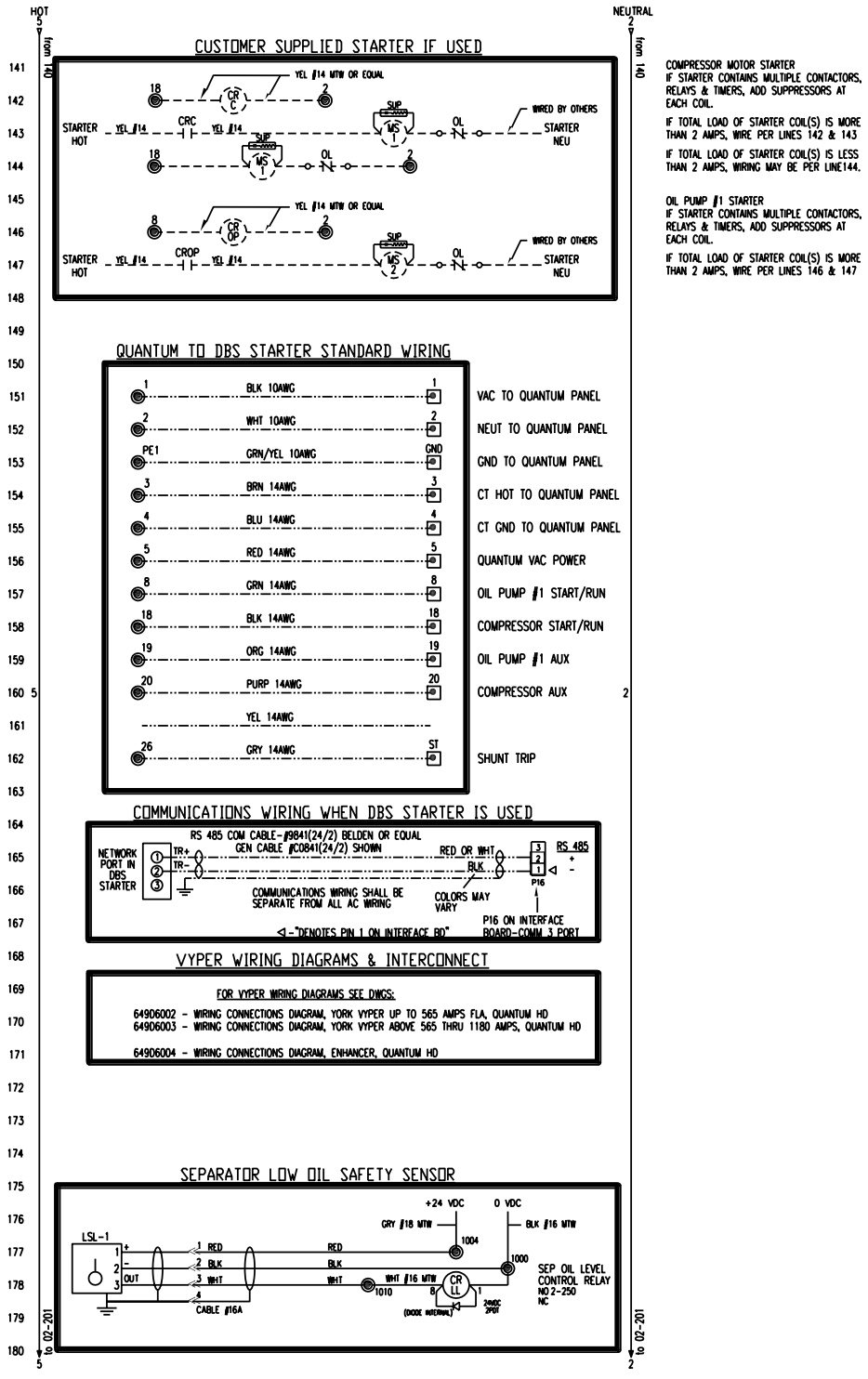
Figure 26e. Wiring Diagram – RWFII with Capacity Slide Transmitter (6/6)


CUSTOMER SUPPLIED 115 OR 230 VAC LISTED CONTROL TRANSFORMER
(WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION) POWER SOURCE IS REQUIRED.
ALL POWER SOURCES SHALL BE GROUNDED ON ONE SIDE.
ISOLATED AND SEPARATED FROM OTHER INDUCTIVE LOADS SUCH AS LIGHTING CIRCUITS
OR FROM FRICK SUPPLIED OR SPECIFIED STARTER - USE MIN #12AWG FOR FEED.
TIE NEUTRAL TO GROUND AT SOURCE
ALL NEUTRALS ENTERING THIS ENCLOSURE SHALL BE TIED TOGETHER AT SOURCE. NOT IN THIS ENCLOSURE
EARTH BUSBAR AT POWER SOURCE
IF SEPARATE FEED OR VOLTAGE FOR HEATER CIRCUIT IS REQUIRED, REMOVE JUMPERS 1 TO 101 AND 2 TO 102 & CONNECT A SEPARATE 115 OR 230 VAC SOURCE TO 101 & 102 (WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION).
GND STUD ON ENCLOSURE
GND STUD ON DOOR
IF 2nd 1KW HTR IS REQ'D MOVE WIRE #104 TO CB1A
OIL SEPARATOR HEATER RELAY
CROH
CB1
CB1A
CB1B
H-1 HEATER
H-2 HEATER
H-3 HEATER
OIL SEPARATOR HEATER (S) 500W OR 1KW EACH WIRING TO BE #14 AWG
CB3
HTR-1
PANEL HEATER (OPTIONAL) 200W EACH
MOTOR SPACE HEATER
CRSH
HTR4
COMPRESSOR MOTOR SPACE HEATER (IF SUPPLIED) (300 WATTS MAXIMUM)
CB2
CONTROL POWER OFF ON
SS1
FL1 EMI FILTER 15A
PW1
PW2
PW3
24VDC 1.75A MAX LOAD
ANA 2 (P3)
ANA 1 (P3)
DIG 2
DIG 1
OPTIONAL
CPU BOARD
COMMUNICATION INTERFACE BOARD
NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM CONTROL PANEL.
NO SINGLE PHASE OVER 300VAC SHALL ENTER OR LEAVE QUANTUM PANEL
ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS OTHERWISE STATED
ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS OTHERWISE STATED
FOR INSTALLATION OF QUANTUM PACKAGE TEST PROCEDURE SEE MMIB NO. 4.11.10.12
FOR INSTALLATION OF COMPUTER BOARDS & EPROMS (WRIST STRAP) SEE MMIB NO. 4.11.10.11
FOR HIGH POT TEST PROCEDURE SEE MMIB NO. 4.11.10.7
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE SEE MMIB NO. 4.11.10.14
NOTE 1
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER IF TERMINATION IF NOT CONFINED OTHERWISE.
NOTE 2
TEMPERATURE WIRING SPECIFICATIONS:
MINIMUM CABLE SIZE FOR SENSOR WIRING TO BE 22 AWG, TWISTED PAIR - BELDEN #9320 OR EQUAL, 20/2 TWISTED PAIR SUGGESTED -IF CABLE HAS A DRAIN WIRE, GROUND DRAIN WIRE AT ONE END ONLY AND INSULATE OTHER END. 2000 FT. MAX. DISTANCE
NOTE 3
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL: -SETPOINT RANGE: -50°F. TO 100°F.
-TEMPERATURE ASSEMBLY: (FRICK P/N 639A0151G03 WITH 1/2"NPT
-WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING, USE BELDEN #8761 OR EQUAL.

090.040-WD0030.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

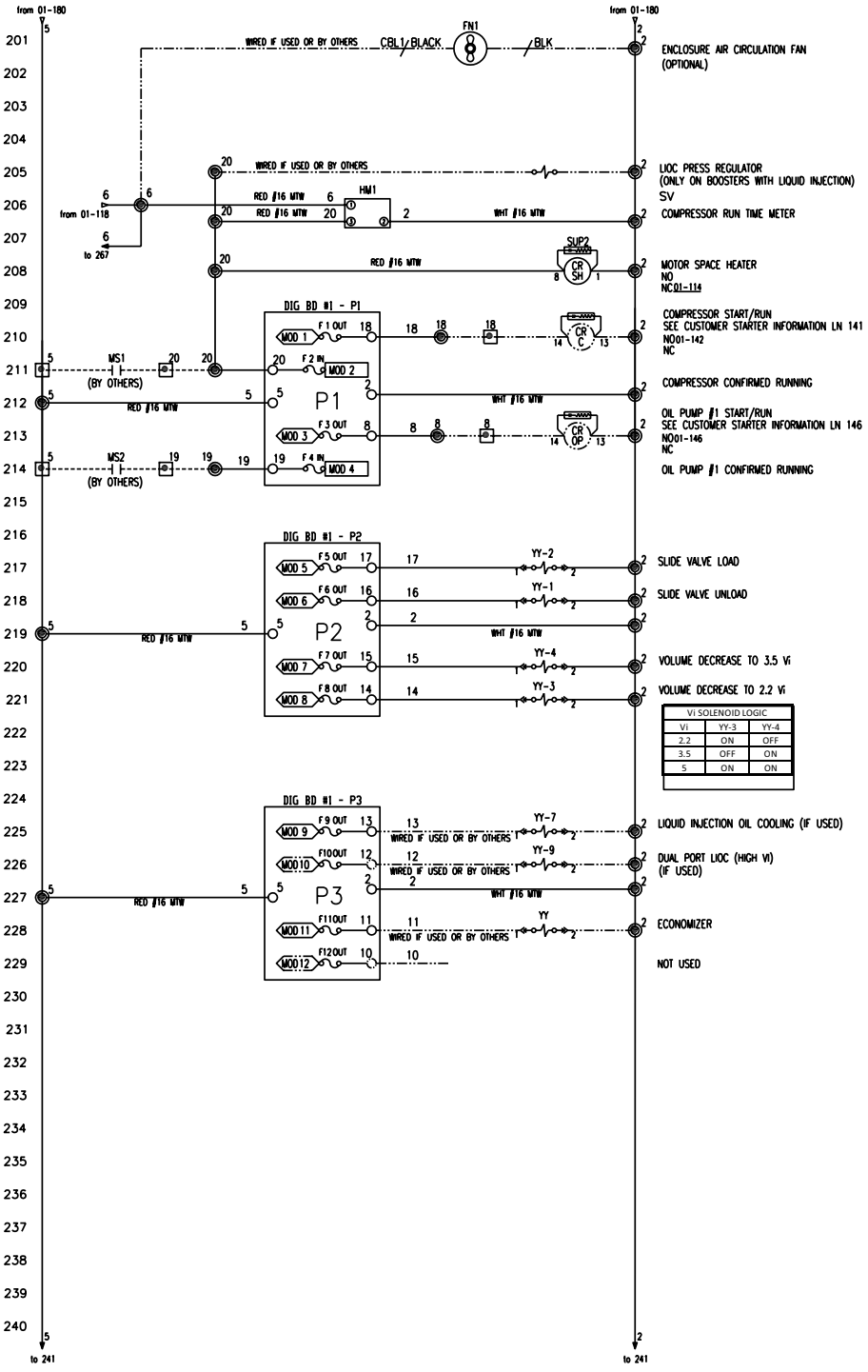
Figure 27. RXF/RXB Wiring Diagram (Cap. Slide Potentiometer) (1/6)


HOT
NEUTRAL
from 140
CUSTOMER SUPPLIED STARTER IF USED
YEL #14 MTW OR EQUAL
CR C
CRC
SUP
MS 1
OL
WIRED BY OTHERS
STARTER HOT
STARTER NEU
CR OP
CROP
MS 2
COMPRESSOR MOTOR STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 142 & 143
IF TOTAL LOAD OF STARTER COIL(S) IS LESS THAN 2 AMPS, WIRING MAY BE PER LINE144.
OIL PUMP #1 STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 146 & 147
QUANTUM TO DBS STARTER STANDARD WIRING
1 BLK 10AWG 1 VAC TO QUANTUM PANEL
2 WHT 10AWG 2 NEUT TO QUANTUM PANEL
PE1 GRN/YEL 10AWG GND GND TO QUANTUM PANEL
3 BRN 14AWG 3 CT HOT TO QUANTUM PANEL
4 BLU 14AWG 4 CT GND TO QUANTUM PANEL
5 RED 14AWG 5 QUANTUM VAC POWER
8 GRN 14AWG 8 OIL PUMP #1 START/RUN
18 BLK 14AWG 18 COMPRESSOR START/RUN
19 ORG 14AWG 19 OIL PUMP #1 AUX
20 PURP 14AWG 20 COMPRESSOR AUX
YEL 14AWG
26 GRY 14AWG ST SHUNT TRIP
COMMUNICATIONS WIRING WHEN DBS STARTER IS USED
RS 485 COM CABLE-#9841(24/2) BELDEN OR EQUAL
GEN CABLE #C0841(24/2) SHOWN
NETWORK PORT IN DBS STARTER
TR+
TR-
RED OR WHT
BLK
RS 485
P16
COMMUNICATIONS WIRING SHALL BE SEPARATE FROM ALL AC WIRING
COLORS MAY VARY
P16 ON INTERFACE BOARD-COMM 3 PORT
◁-"DENOTES PIN 1 ON INTERFACE BD"
VYPER WIRING DIAGRAMS & INTERCONNECT
FOR VYPER WIRING DIAGRAMS SEE DWGS:
64906002 - WIRING CONNECTIONS DIAGRAM, YORK VYPER UP TO 565 AMPS FLA, QUANTUM HD
64906003 - WIRING CONNECTIONS DIAGRAM, YORK VYPER ABOVE 565 THRU 1180 AMPS, QUANTUM HD
64906004 - WIRING CONNECTIONS DIAGRAM, ENHANCER, QUANTUM HD
SEPARATOR LOW OIL SAFETY SENSOR
+24 VDC
0 VDC
GRY #18 MTW
BLK #16 MTW
1004
1000
LSL-1
OUT
CABLE #16A
WHT #16 MTW
1010
CR LL
SEP OIL LEVEL CONTROL RELAY
NO 2-250
NC
(DIODE MATERIAL)
240VAC 2POF
to 02-201
to 02-201

090.040-WD0031.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

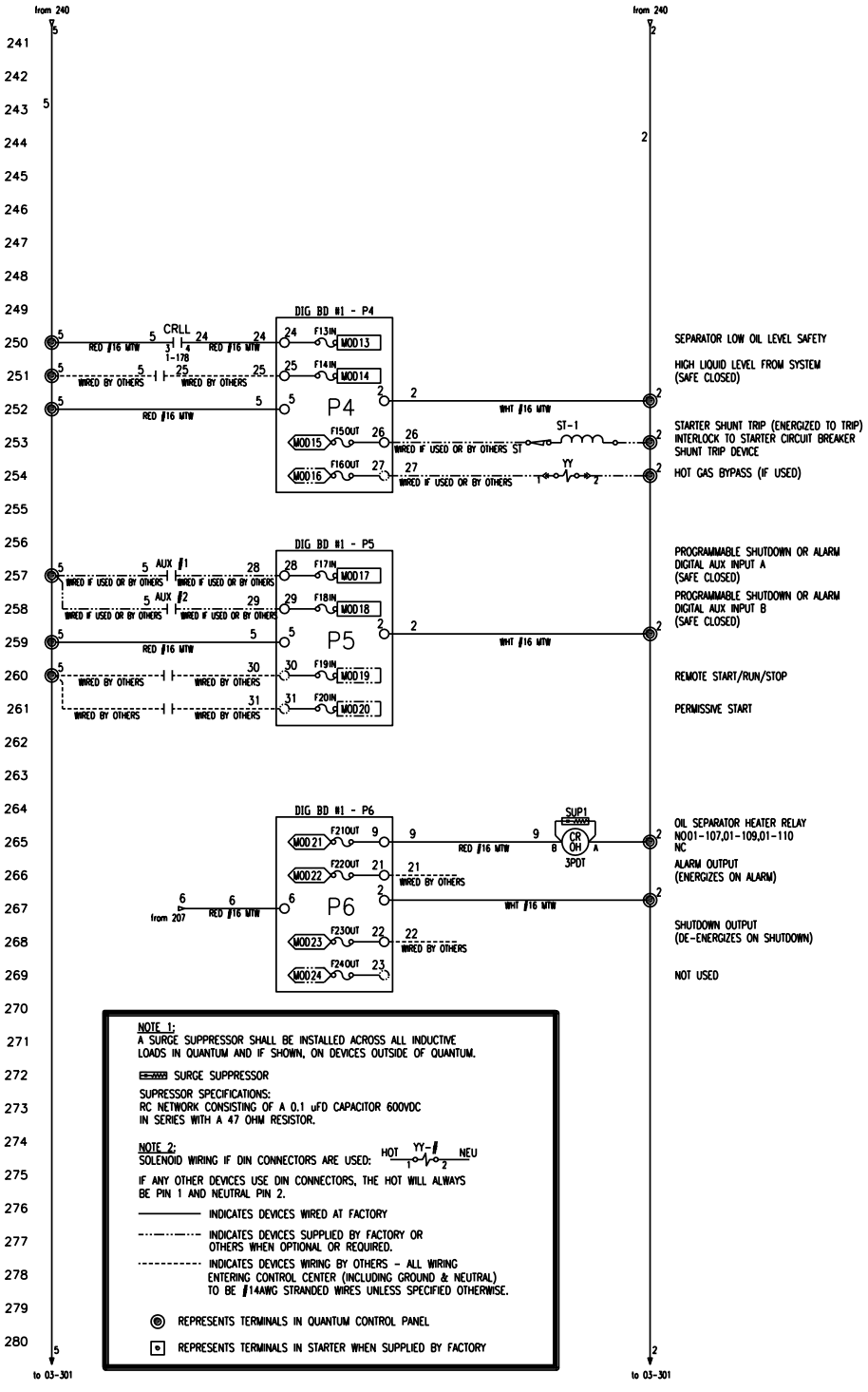
Figure 27a. RXF / RXB Wiring Diagram (Capacity Slide Potentiometer) (2/6)



090.040-WD0032.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

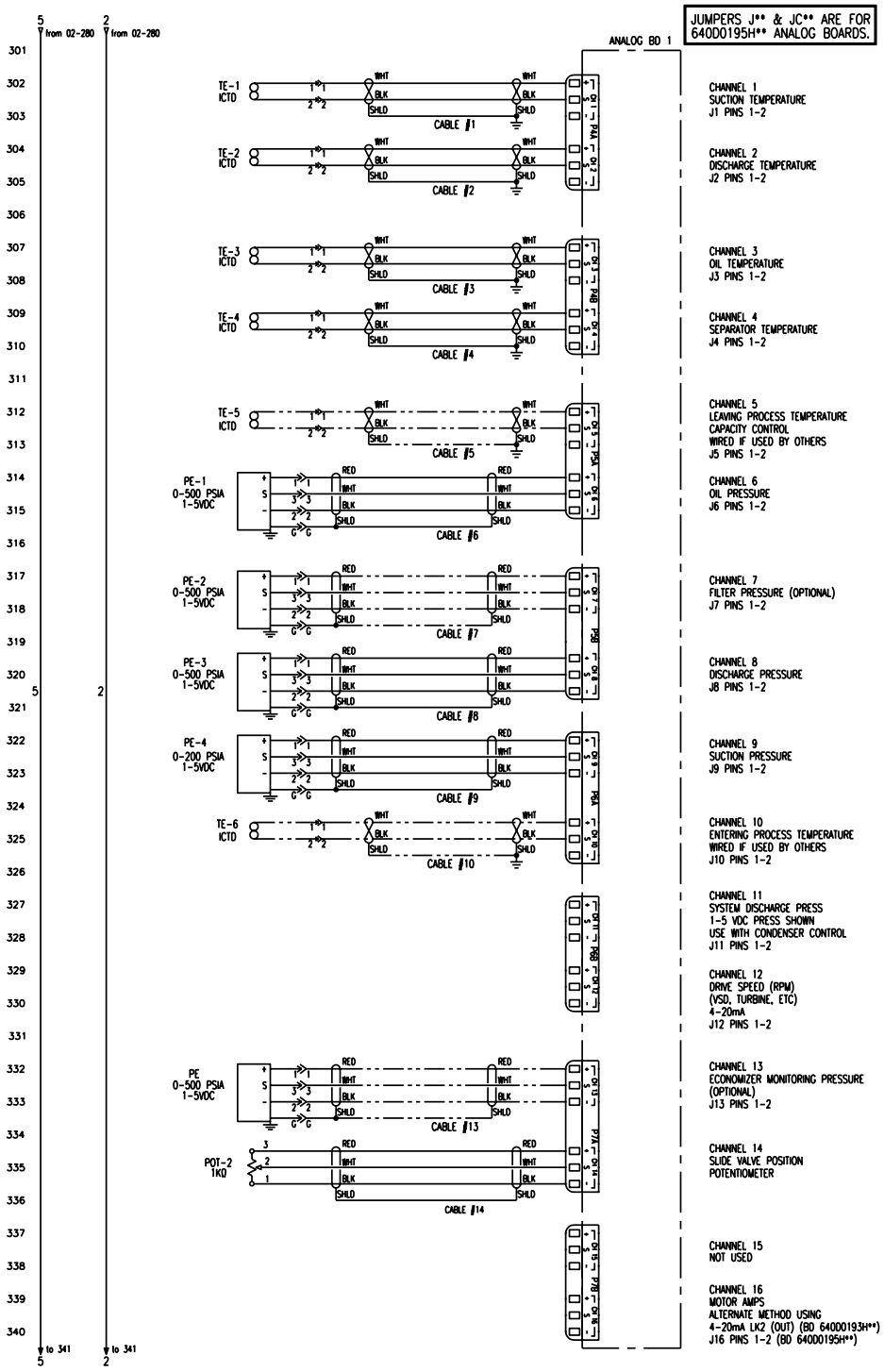
Figure 27b. RXF / RXB Wiring Diagram (Capacity Slide Potentiometer)(3/6)


from 240
from 240
DIG BD #1 - P4
DIG BD #1 - P5
DIG BD #1 - P6
P4
P5
P6
CRLL
1-178
ST-1
YY
SUP1
CR
OH
3PDT
SEPARATOR LOW OIL LEVEL SAFETY
HIGH LIQUID LEVEL FROM SYSTEM (SAFE CLOSED)
STARTER SHUNT TRIP (ENERGIZED TO TRIP) INTERLOCK TO STARTER CIRCUIT BREAKER SHUNT TRIP DEVICE
HOT GAS BYPASS (IF USED)
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT A (SAFE CLOSED)
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT B (SAFE CLOSED)
REMOTE START/RUN/STOP
PERMISSIVE START
OIL SEPARATOR HEATER RELAY NO01-107,01-109,01-110 NC
ALARM OUTPUT (ENERGIZES ON ALARM)
SHUTDOWN OUTPUT (DE-ENERGIZES ON SHUTDOWN)
NOT USED
NOTE 1:
A SURGE SUPPRESSOR SHALL BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.
SURGE SUPPRESSOR
SUPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A 0.1 uFD CAPACITOR 600VDC IN SERIES WITH A 47 OHM RESISTOR.
NOTE 2:
SOLENOID WIRING IF DIN CONNECTORS ARE USED:
HOT
YY-#
NEU
IF ANY OTHER DEVICES USE DIN CONNECTORS, THE HOT WILL ALWAYS BE PIN 1 AND NEUTRAL PIN 2.
INDICATES DEVICES WIRED AT FACTORY
INDICATES DEVICES SUPPLIED BY FACTORY OR OTHERS WHEN OPTIONAL OR REQUIRED.
INDICATES DEVICES WIRING BY OTHERS - ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.
REPRESENTS TERMINALS IN QUANTUM CONTROL PANEL
REPRESENTS TERMINALS IN STARTER WHEN SUPPLIED BY FACTORY
to 03-301
to 03-301

090.040-WD0033.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

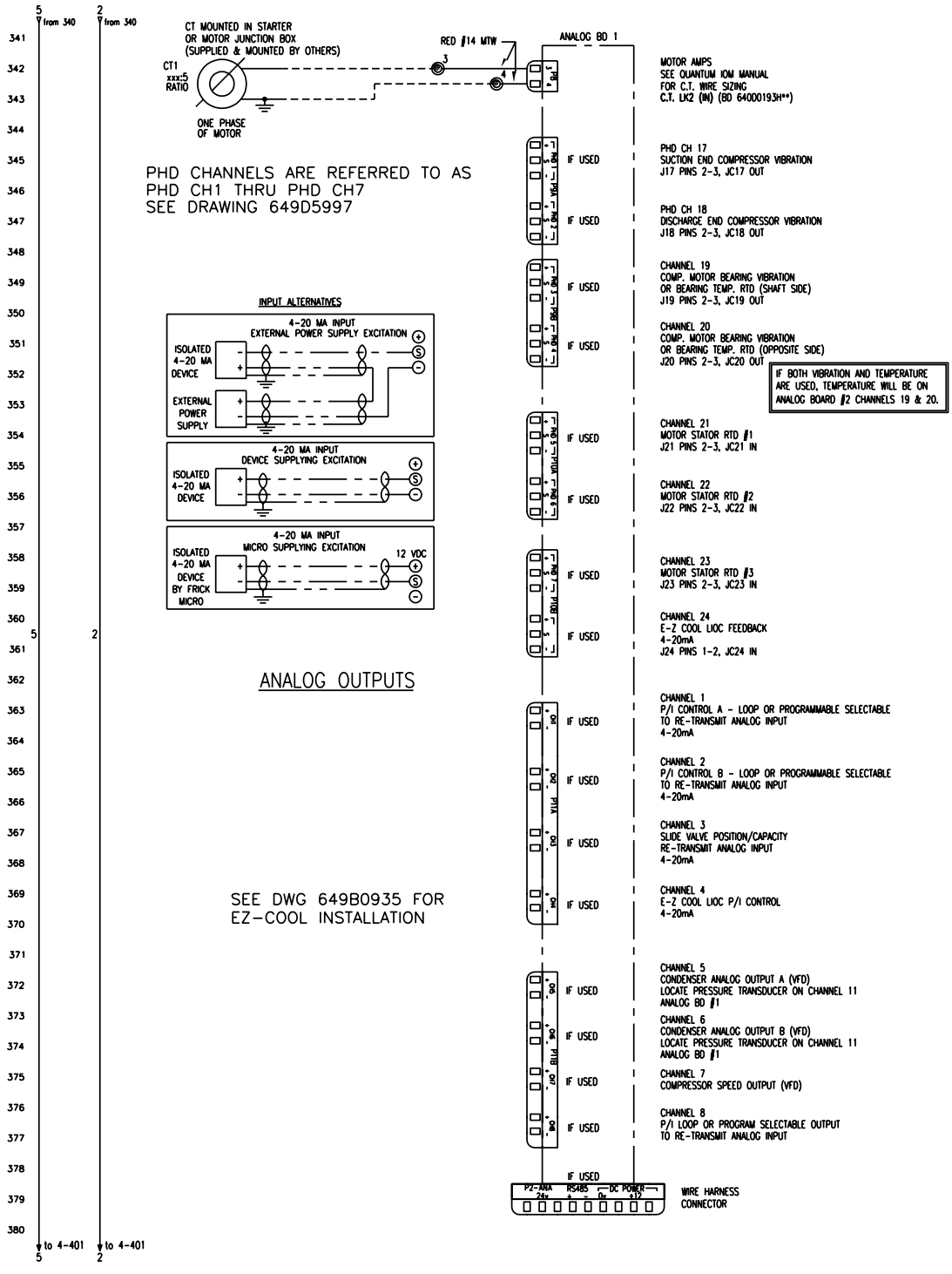
Figure 27c. RXF / RXB Wiring Diagram (Capacity Slide Potentiometer) (4/6)



090.040-WD0034.eps

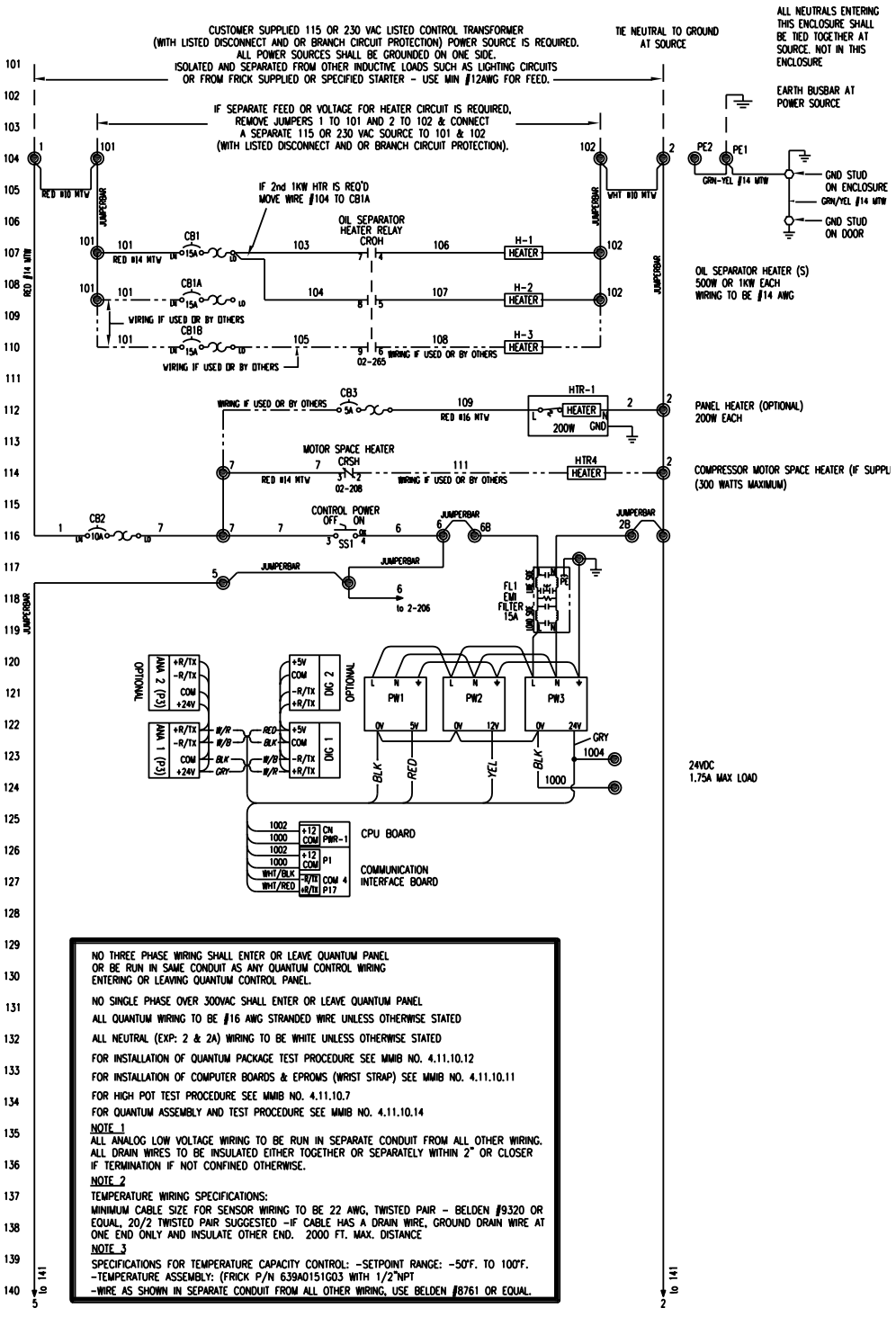
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 27d. RXF / RXB Wiring Diagram (Capacity Slide Potentiometer) (5/6)



This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

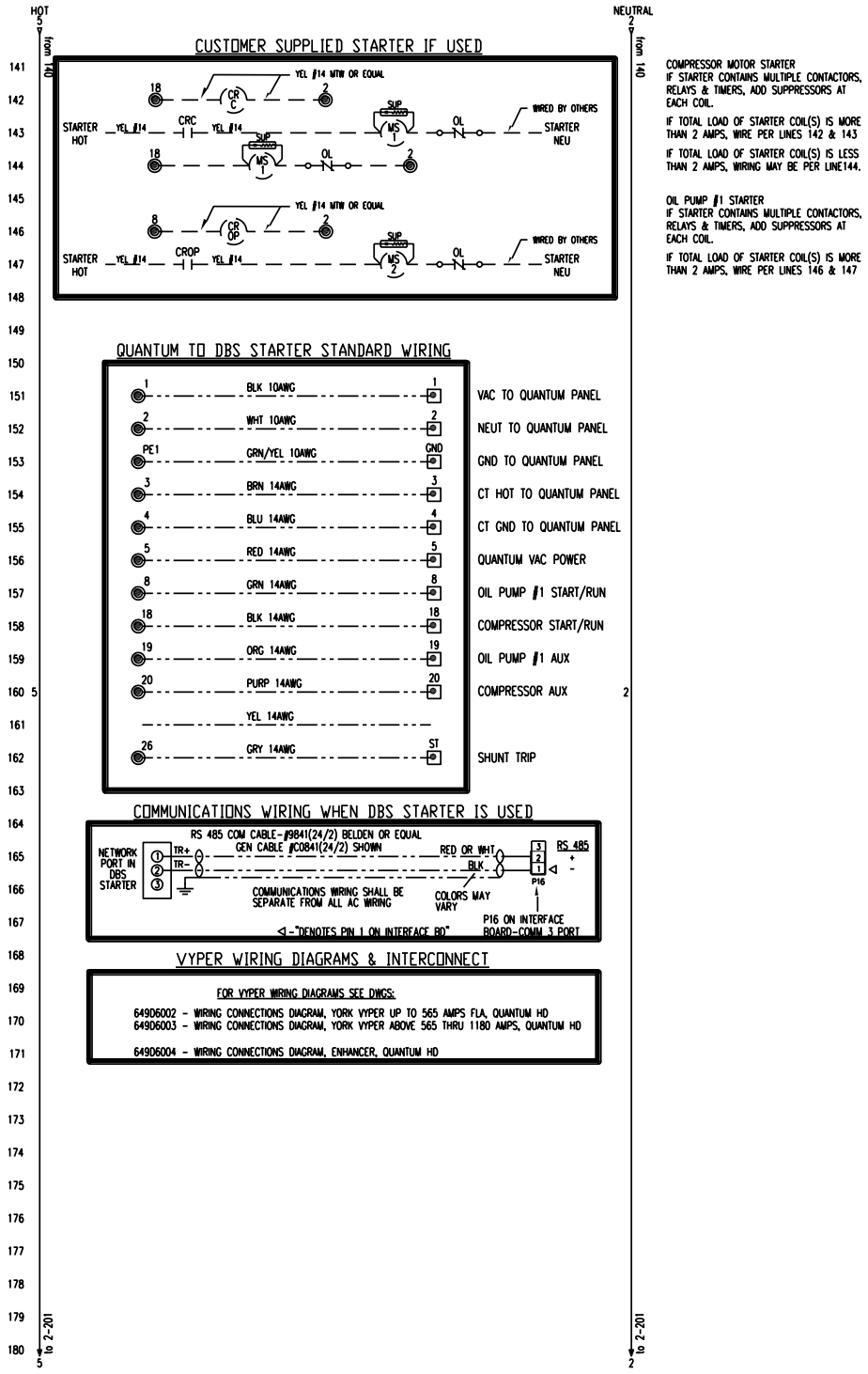
Figure 27e. RXF / RXB Wiring Diagram (Capacity Slide Potentiometer) (6/6)


CUSTOMER SUPPLIED 115 OR 230 VAC LISTED CONTROL TRANSFORMER
(WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION) POWER SOURCE IS REQUIRED.
ALL POWER SOURCES SHALL BE GROUNDED ON ONE SIDE.
ISOLATED AND SEPARATED FROM OTHER INDUCTIVE LOADS SUCH AS LIGHTING CIRCUITS
OR FROM FRICK SUPPLIED OR SPECIFIED STARTER - USE MIN #12AWG FOR FEED.
TIE NEUTRAL TO GROUND AT SOURCE
ALL NEUTRALS ENTERING THIS ENCLOSURE SHALL BE TIED TOGETHER AT SOURCE. NOT IN THIS ENCLOSURE
EARTH BUSBAR AT POWER SOURCE
IF SEPARATE FEED OR VOLTAGE FOR HEATER CIRCUIT IS REQUIRED, REMOVE JUMPERS 1 TO 101 AND 2 TO 102 & CONNECT A SEPARATE 115 OR 230 VAC SOURCE TO 101 & 102 (WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION).
GND STUD ON ENCLOSURE
GND STUD ON DOOR
IF 2nd 1KW HTR IS REQ'D MOVE WIRE #104 TO CB1A
OIL SEPARATOR HEATER RELAY CROH
OIL SEPARATOR HEATER (S) 500W OR 1KW EACH WIRING TO BE #14 AWG
WIRING IF USED OR BY OTHERS
PANEL HEATER (OPTIONAL) 200W EACH
MOTOR SPACE HEATER CRSH
COMPRESSOR MOTOR SPACE HEATER (IF SUPPLI (300 WATTS MAXIMUM)
CONTROL POWER OFF ON SS1
24VDC 1.75A MAX LOAD
CPU BOARD
COMMUNICATION INTERFACE BOARD
NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM CONTROL PANEL.
NO SINGLE PHASE OVER 300VAC SHALL ENTER OR LEAVE QUANTUM PANEL
ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS OTHERWISE STATED
ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS OTHERWISE STATED
FOR INSTALLATION OF QUANTUM PACKAGE TEST PROCEDURE SEE MMIB NO. 4.11.10.12
FOR INSTALLATION OF COMPUTER BOARDS & EPROMS (WRIST STRAP) SEE MMIB NO. 4.11.10.11
FOR HIGH POT TEST PROCEDURE SEE MMIB NO. 4.11.10.7
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE SEE MMIB NO. 4.11.10.14
NOTE 1
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER IF TERMINATION IF NOT CONFINED OTHERWISE.
NOTE 2
TEMPERATURE WIRING SPECIFICATIONS:
MINIMUM CABLE SIZE FOR SENSOR WIRING TO BE 22 AWG, TWISTED PAIR - BELDEN #9320 OR EQUAL, 20/2 TWISTED PAIR SUGGESTED -IF CABLE HAS A DRAIN WIRE, GROUND DRAIN WIRE AT ONE END ONLY AND INSULATE OTHER END. 2000 FT. MAX. DISTANCE
NOTE 3
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL: -SETPOINT RANGE: -50°F. TO 100°F.
-TEMPERATURE ASSEMBLY: (FRICK P/N 639A0151G03 WITH 1/2"NPT
-WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING, USE BELDEN #8761 OR EQUAL.

090.040-WD0036.eps

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

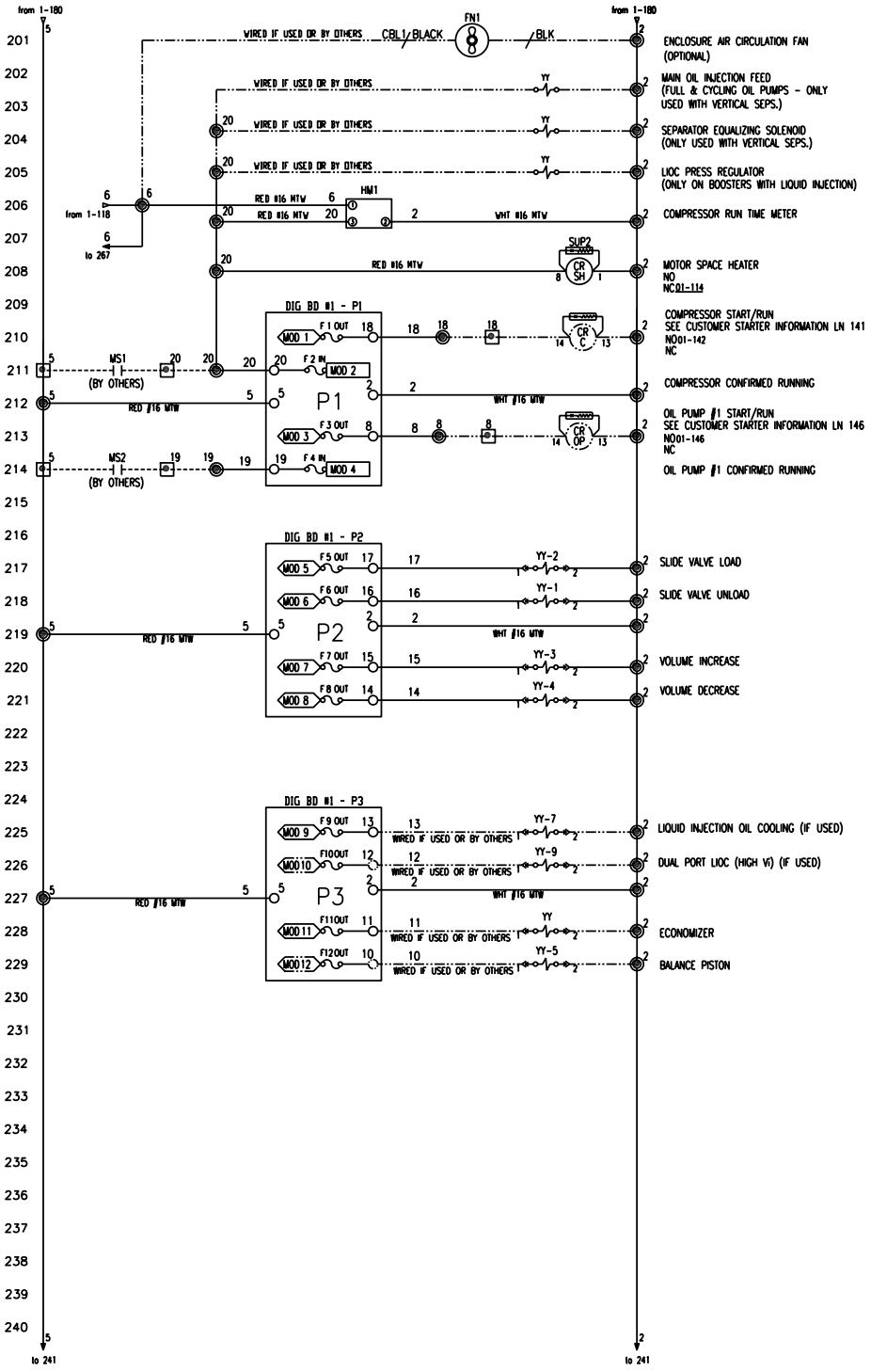
Figure 28. RWBII Wiring Diagram (Cap. Slide Potentiometer) (1/6)


HOT
NEUTRAL
from 140
CUSTOMER SUPPLIED STARTER IF USED
YEL #14 MTW OR EQUAL
CR C
CRC
STARTER HOT
YEL #14
SUP
MS 1
OL
WIRED BY OTHERS
STARTER NEU
CR OP
CROP
MS 2
COMPRESSOR MOTOR STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 142 & 143
IF TOTAL LOAD OF STARTER COIL(S) IS LESS THAN 2 AMPS, WIRING MAY BE PER LINE144.
OIL PUMP #1 STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 146 & 147
QUANTUM TO DBS STARTER STANDARD WIRING
BLK 10AWG
VAC TO QUANTUM PANEL
WHT 10AWG
NEUT TO QUANTUM PANEL
PE1
GRN/YEL 10AWG
GND TO QUANTUM PANEL
BRN 14AWG
CT HOT TO QUANTUM PANEL
BLU 14AWG
CT GND TO QUANTUM PANEL
RED 14AWG
QUANTUM VAC POWER
GRN 14AWG
OIL PUMP #1 START/RUN
BLK 14AWG
COMPRESSOR START/RUN
ORG 14AWG
OIL PUMP #1 AUX
PURP 14AWG
COMPRESSOR AUX
YEL 14AWG
GRY 14AWG
SHUNT TRIP
COMMUNICATIONS WIRING WHEN DBS STARTER IS USED
RS 485 COM CABLE-#9841(24/2) BELDEN OR EQUAL
GEN CABLE #C0841(24/2) SHOWN
NETWORK PORT IN DBS STARTER
TR+
TR-
RED OR WHT
BLK
RS 485
P16
COMMUNICATIONS WIRING SHALL BE SEPARATE FROM ALL AC WIRING
COLORS MAY VARY
◁-"DENOTES PIN 1 ON INTERFACE BD"
P16 ON INTERFACE BOARD-COMM 3 PORT
VYPER WIRING DIAGRAMS & INTERCONNECT
FOR VYPER WIRING DIAGRAMS SEE DWGS:
649D6002 - WIRING CONNECTIONS DIAGRAM, YORK VYPER UP TO 565 AMPS FLA, QUANTUM HD
649D6003 - WIRING CONNECTIONS DIAGRAM, YORK VYPER ABOVE 565 THRU 1180 AMPS, QUANTUM HD
649D6004 - WIRING CONNECTIONS DIAGRAM, ENHANCER, QUANTUM HD
to 2-201

090.040-WD0037.eps

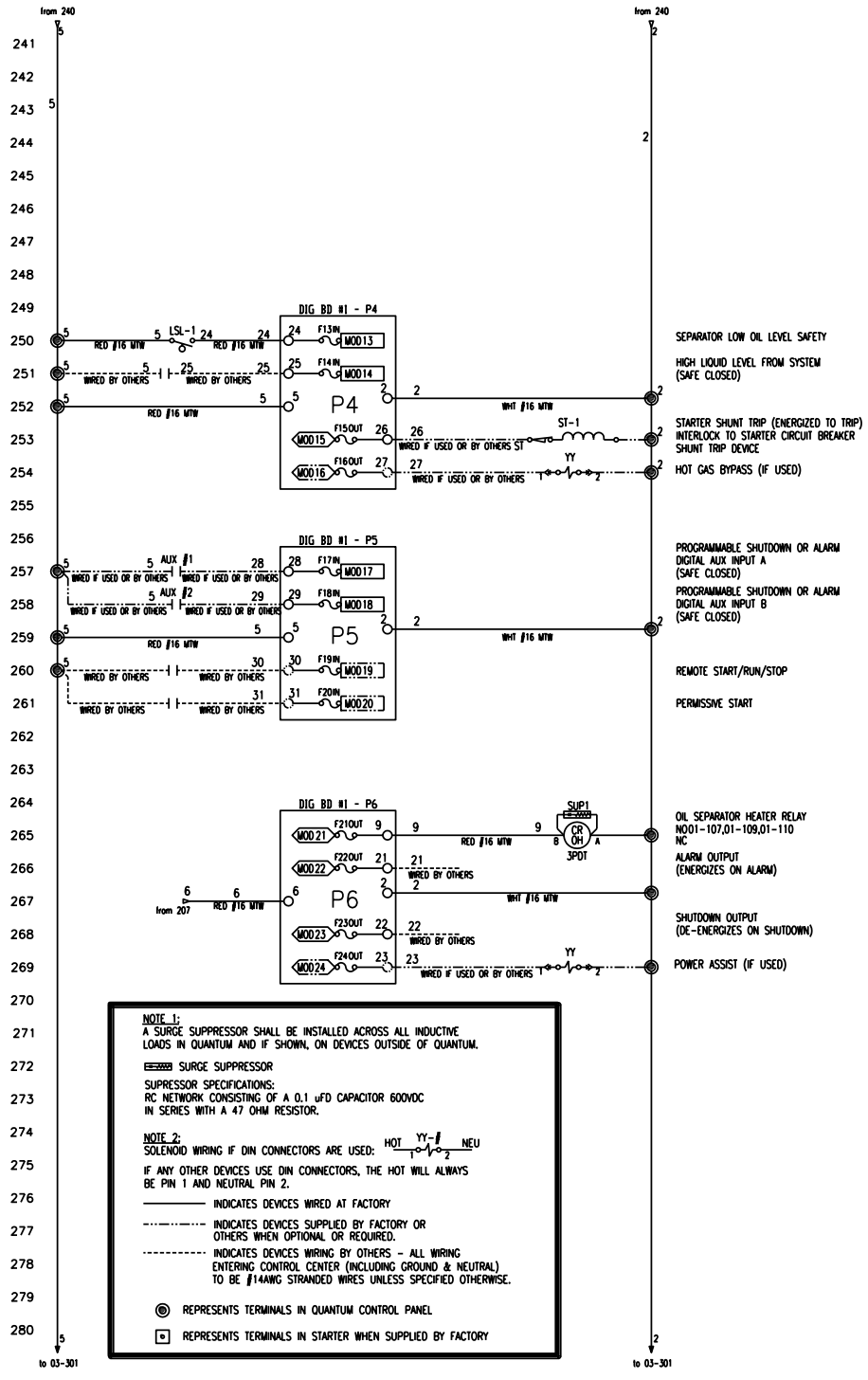
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 28a. RWBII Wiring Diagram (Capacity Slide Potentiometer) (2/6)



This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

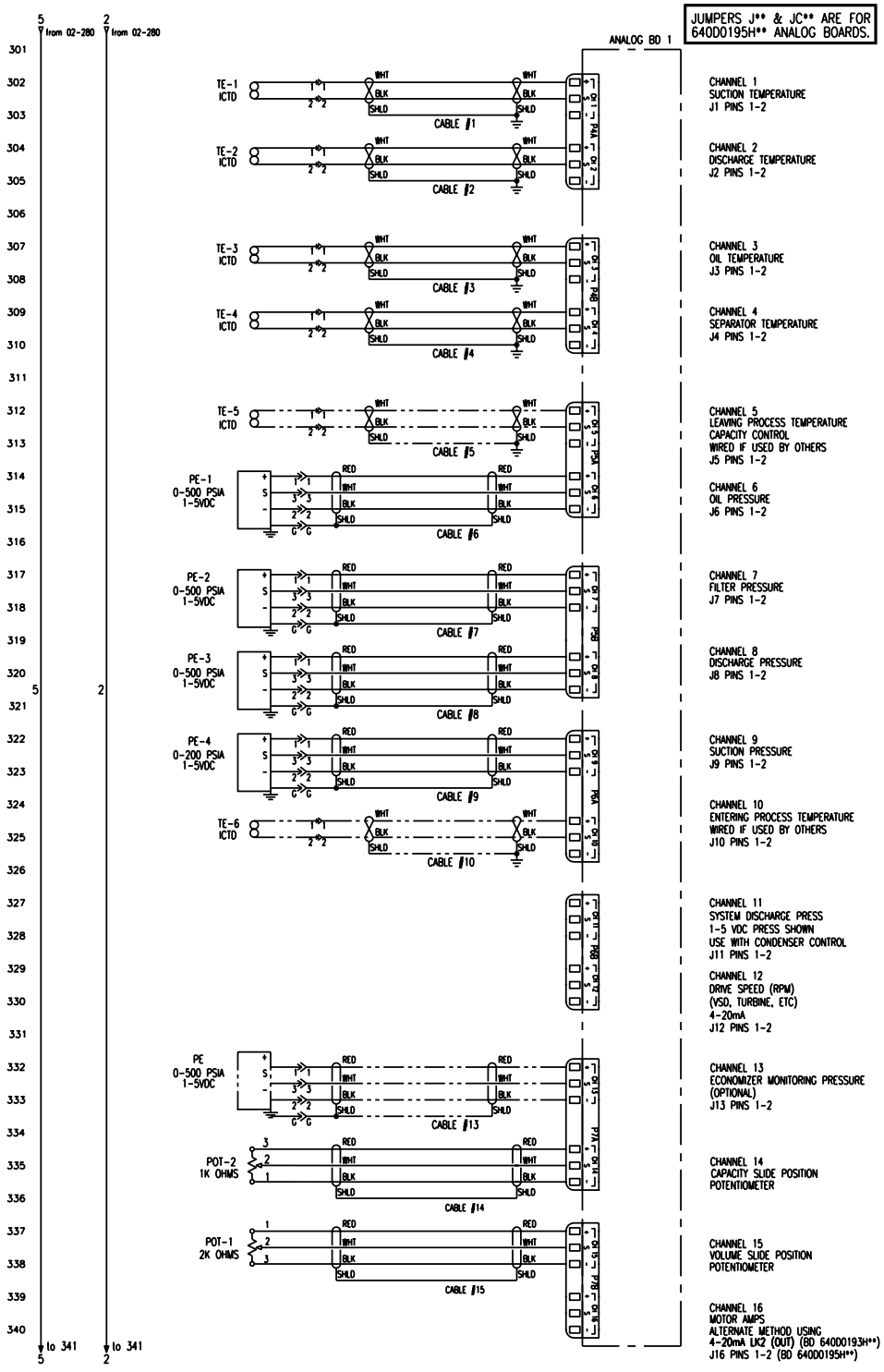
Figure 28b. RWBII Wiring Diagram (Capacity Slide Potentiometer) (3/6)


from 240
to 03-301
DIG BD #1 - P4
DIG BD #1 - P5
DIG BD #1 - P6
P4
P5
P6
LSL-1
ST-1
YY
SUP1
CR
3PDT
SEPARATOR LOW OIL LEVEL SAFETY
HIGH LIQUID LEVEL FROM SYSTEM (SAFE CLOSED)
STARTER SHUNT TRIP (ENERGIZED TO TRIP) INTERLOCK TO STARTER CIRCUIT BREAKER SHUNT TRIP DEVICE
HOT GAS BYPASS (IF USED)
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT A (SAFE CLOSED)
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT B (SAFE CLOSED)
REMOTE START/RUN/STOP
PERMISSIVE START
OIL SEPARATOR HEATER RELAY NO01-107,01-109,01-110 NC
ALARM OUTPUT (ENERGIZES ON ALARM)
SHUTDOWN OUTPUT (DE-ENERGIZES ON SHUTDOWN)
POWER ASSIST (IF USED)
NOTE 1:
A SURGE SUPPRESSOR SHALL BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.
SURGE SUPPRESSOR
SUPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A 0.1 uFD CAPACITOR 600VDC IN SERIES WITH A 47 OHM RESISTOR.
NOTE 2:
SOLENOID WIRING IF DIN CONNECTORS ARE USED:
HOT YY NEU
IF ANY OTHER DEVICES USE DIN CONNECTORS, THE HOT WILL ALWAYS BE PIN 1 AND NEUTRAL PIN 2.
INDICATES DEVICES WIRED AT FACTORY
INDICATES DEVICES SUPPLIED BY FACTORY OR OTHERS WHEN OPTIONAL OR REQUIRED.
INDICATES DEVICES WIRING BY OTHERS - ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.
REPRESENTS TERMINALS IN QUANTUM CONTROL PANEL
REPRESENTS TERMINALS IN STARTER WHEN SUPPLIED BY FACTORY

090.040-WD0039.eps

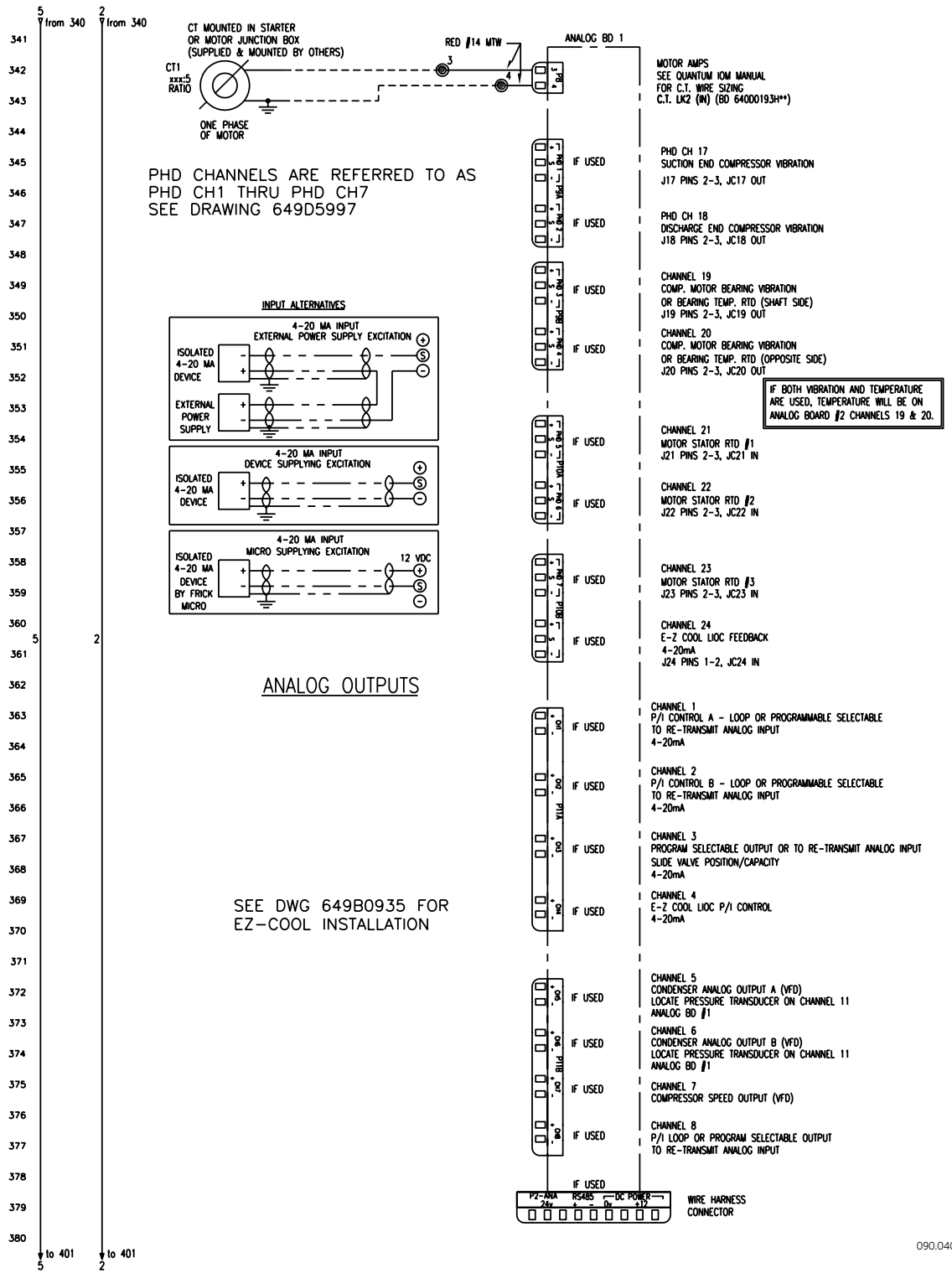
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 28c. RWBII Wiring Diagram (Capacity Slide Potentiometer) (4/6)



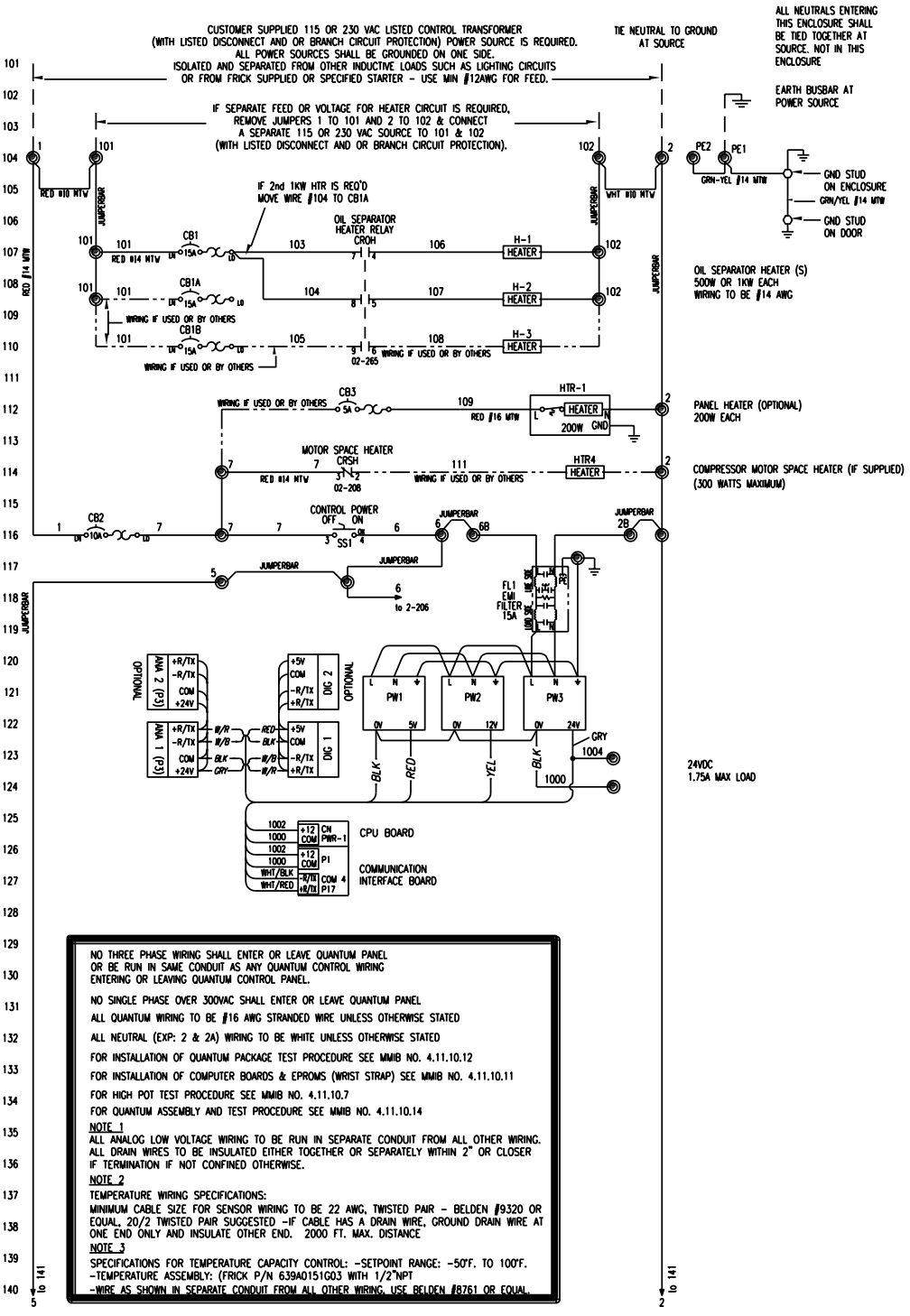
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 28d. RWBII Wiring Diagram (Capacity Slide Potentiometer) (5/6)



This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 28e. RWBII Wiring Diagram (Capacity Slide Potentiometer) (6/6)


CUSTOMER SUPPLIED 115 OR 230 VAC LISTED CONTROL TRANSFORMER
(WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION) POWER SOURCE IS REQUIRED.
ALL POWER SOURCES SHALL BE GROUNDED ON ONE SIDE.
ISOLATED AND SEPARATED FROM OTHER INDUCTIVE LOADS SUCH AS LIGHTING CIRCUITS
OR FROM FRICK SUPPLIED OR SPECIFIED STARTER - USE MIN #12AWG FOR FEED.
TIE NEUTRAL TO GROUND AT SOURCE
ALL NEUTRALS ENTERING THIS ENCLOSURE SHALL BE TIED TOGETHER AT SOURCE. NOT IN THIS ENCLOSURE
EARTH BUSBAR AT POWER SOURCE
IF SEPARATE FEED OR VOLTAGE FOR HEATER CIRCUIT IS REQUIRED, REMOVE JUMPERS 1 TO 101 AND 2 TO 102 & CONNECT A SEPARATE 115 OR 230 VAC SOURCE TO 101 & 102 (WITH LISTED DISCONNECT AND OR BRANCH CIRCUIT PROTECTION).
GND STUD ON ENCLOSURE
GND STUD ON DOOR
IF 2nd 1KW HTR IS REQ'D MOVE WIRE #104 TO CB1A
OIL SEPARATOR HEATER RELAY CR0H
OIL SEPARATOR HEATER (S) 500W OR 1KW EACH WIRING TO BE #14 AWG
WIRING IF USED OR BY OTHERS
PANEL HEATER (OPTIONAL) 200W EACH
MOTOR SPACE HEATER CR5H
COMPRESSOR MOTOR SPACE HEATER (IF SUPPLIED) (300 WATTS MAXIMUM)
CONTROL POWER OFF ON
JUMPERBAR
FL1 EMI FILTER 15A
24VDC 1.75A MAX LOAD
CPU BOARD
COMMUNICATION INTERFACE BOARD
NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR LEAVING QUANTUM CONTROL PANEL.
NO SINGLE PHASE OVER 300VAC SHALL ENTER OR LEAVE QUANTUM PANEL
ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS OTHERWISE STATED
ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS OTHERWISE STATED
FOR INSTALLATION OF QUANTUM PACKAGE TEST PROCEDURE SEE MMIB NO. 4.11.10.12
FOR INSTALLATION OF COMPUTER BOARDS & EPROMS (WRIST STRAP) SEE MMIB NO. 4.11.10.11
FOR HIGH POT TEST PROCEDURE SEE MMIB NO. 4.11.10.7
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE SEE MMIB NO. 4.11.10.14
NOTE 1
ALL ANALOG LOW VOLTAGE WIRING TO BE RUN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. ALL DRAIN WIRES TO BE INSULATED EITHER TOGETHER OR SEPARATELY WITHIN 2" OR CLOSER IF TERMINATION IF NOT CONFINED OTHERWISE.
NOTE 2
TEMPERATURE WIRING SPECIFICATIONS:
MINIMUM CABLE SIZE FOR SENSOR WIRING TO BE 22 AWG, TWISTED PAIR - BELDEN #9320 OR EQUAL, 20/2 TWISTED PAIR SUGGESTED -IF CABLE HAS A DRAIN WIRE, GROUND DRAIN WIRE AT ONE END ONLY AND INSULATE OTHER END. 2000 FT. MAX. DISTANCE
NOTE 3
SPECIFICATIONS FOR TEMPERATURE CAPACITY CONTROL: -SETPOINT RANGE: -50°F. TO 100°F.
-TEMPERATURE ASSEMBLY: (FRICK P/N 639A0151G03 WITH 1/2"NPT
-WIRE AS SHOWN IN SEPARATE CONDUIT FROM ALL OTHER WIRING. USE BELDEN #8761 OR EQUAL.

090.040-WD0042.eps

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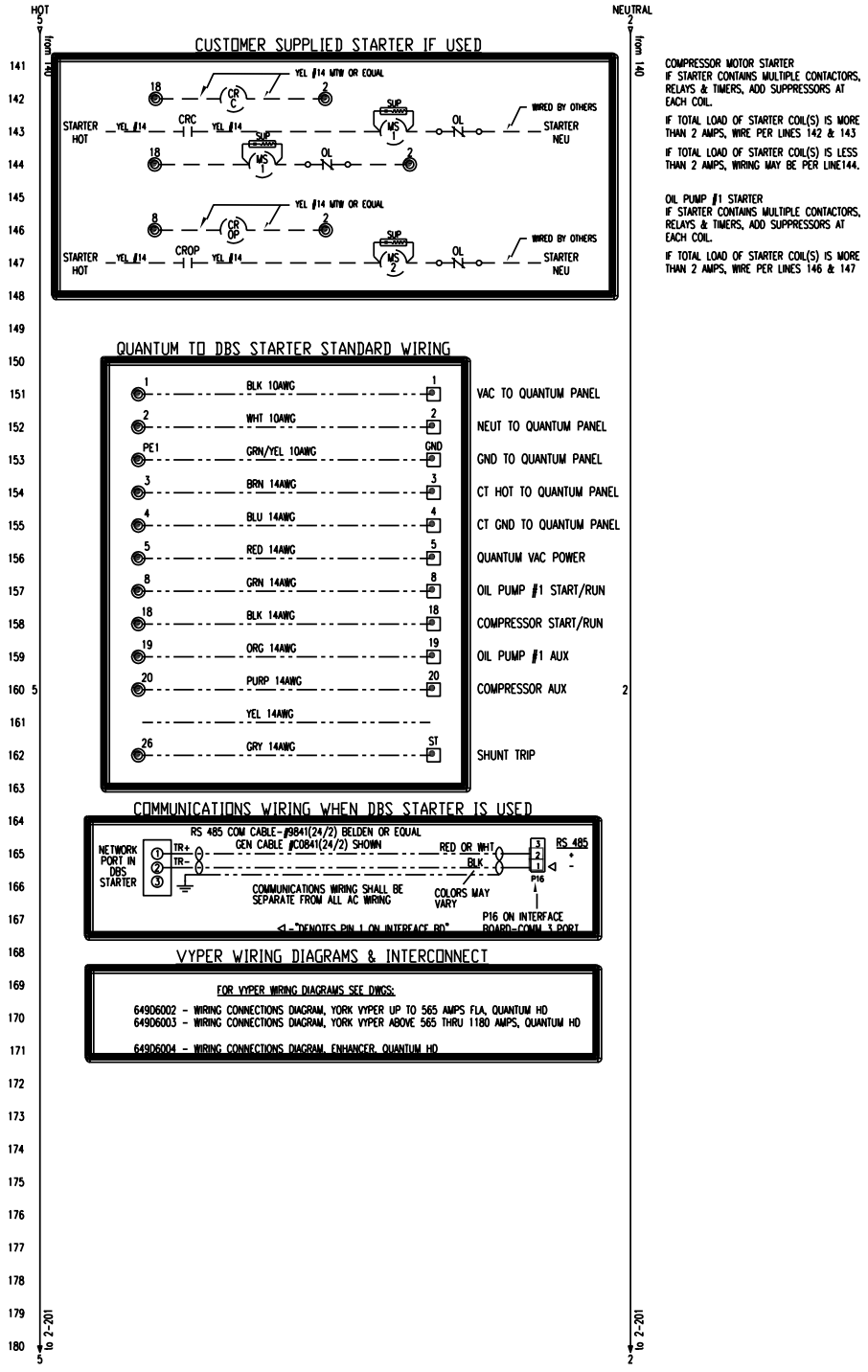
Figure 29. RDB Wiring Diagram (1/6)


HOT
NEUTRAL
from 1-140
CUSTOMER SUPPLIED STARTER IF USED
YEL #14 MTW OR EQUAL
WIRED BY OTHERS
STARTER HOT
STARTER NEU
COMPRESSOR MOTOR STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 142 & 143
IF TOTAL LOAD OF STARTER COIL(S) IS LESS THAN 2 AMPS, WIRING MAY BE PER LINE144.
OIL PUMP #1 STARTER
IF STARTER CONTAINS MULTIPLE CONTACTORS, RELAYS & TIMERS, ADD SUPPRESSORS AT EACH COIL.
IF TOTAL LOAD OF STARTER COIL(S) IS MORE THAN 2 AMPS, WIRE PER LINES 146 & 147
QUANTUM TO DBS STARTER STANDARD WIRING
BLK 10AWG — VAC TO QUANTUM PANEL
WHT 10AWG — NEUT TO QUANTUM PANEL
GRN/YEL 10AWG — GND TO QUANTUM PANEL
BRN 14AWG — CT HOT TO QUANTUM PANEL
BLU 14AWG — CT GND TO QUANTUM PANEL
RED 14AWG — QUANTUM VAC POWER
GRN 14AWG — OIL PUMP #1 START/RUN
BLK 14AWG — COMPRESSOR START/RUN
ORG 14AWG — OIL PUMP #1 AUX
PURP 14AWG — COMPRESSOR AUX
YEL 14AWG
GRY 14AWG — SHUNT TRIP
COMMUNICATIONS WIRING WHEN DBS STARTER IS USED
RS 485 COM CABLE-#9841(24/2) BELDEN OR EQUAL
GEN CABLE #C0841(24/2) SHOWN
NETWORK PORT IN DBS STARTER
TR+
TR-
RED OR WHT
BLK
RS 485
COMMUNICATIONS WIRING SHALL BE SEPARATE FROM ALL AC WIRING
COLORS MAY VARY
P16
P16 ON INTERFACE BOARD-COMM 3 PORT
◁-"DENOTES PIN 1 ON INTERFACE BD"
VYPER WIRING DIAGRAMS & INTERCONNECT
FOR VYPER WIRING DIAGRAMS SEE DWGS:
649D6002 - WIRING CONNECTIONS DIAGRAM, YORK VYPER UP TO 565 AMPS FLA, QUANTUM HD
649D6003 - WIRING CONNECTIONS DIAGRAM, YORK VYPER ABOVE 565 THRU 1180 AMPS, QUANTUM HD
649D6004 - WIRING CONNECTIONS DIAGRAM, ENHANCER, QUANTUM HD
to 2-201

090.040-WD0043.eps

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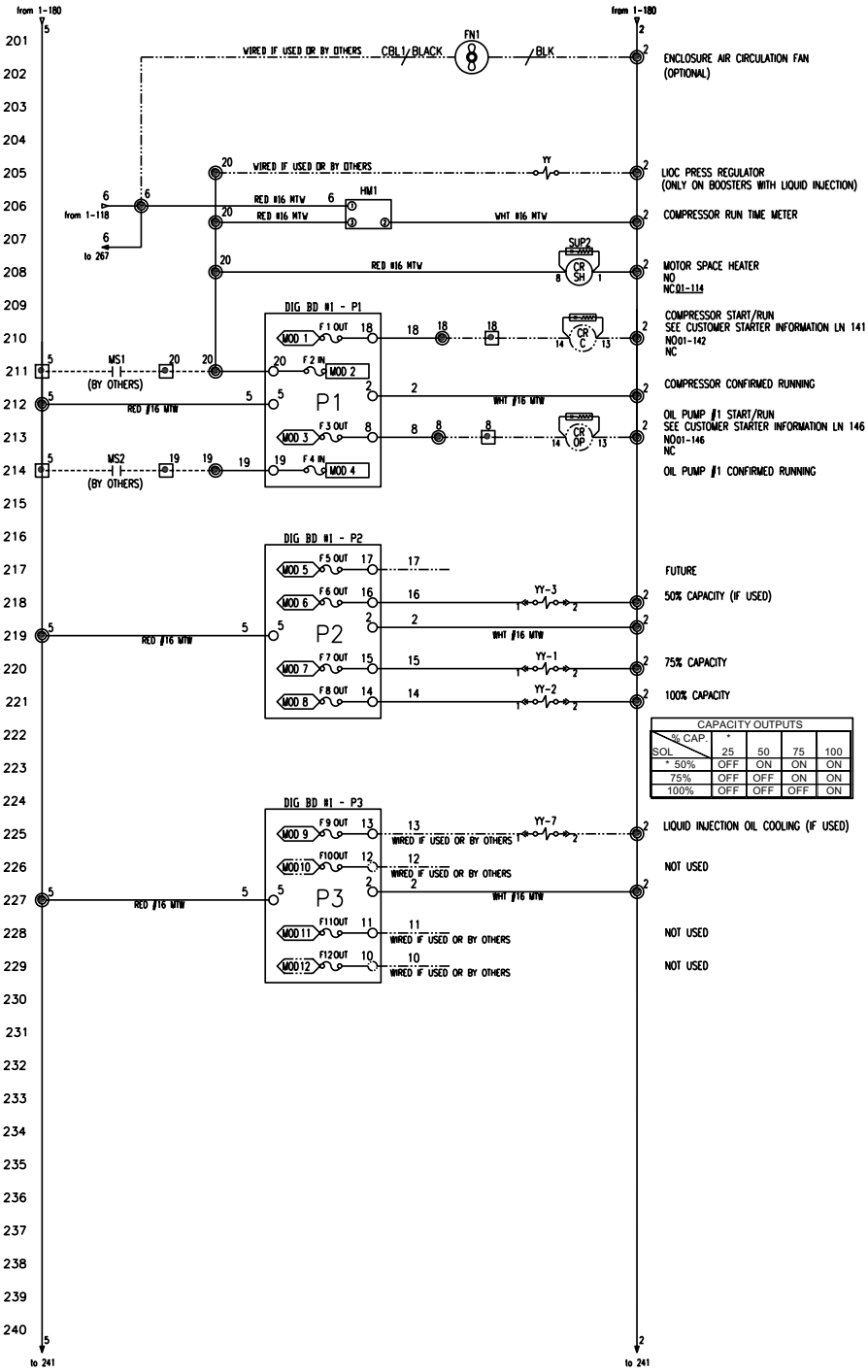
Figure 29a. RDB Wiring Diagram (2/6)



090.040-WD0044.eps

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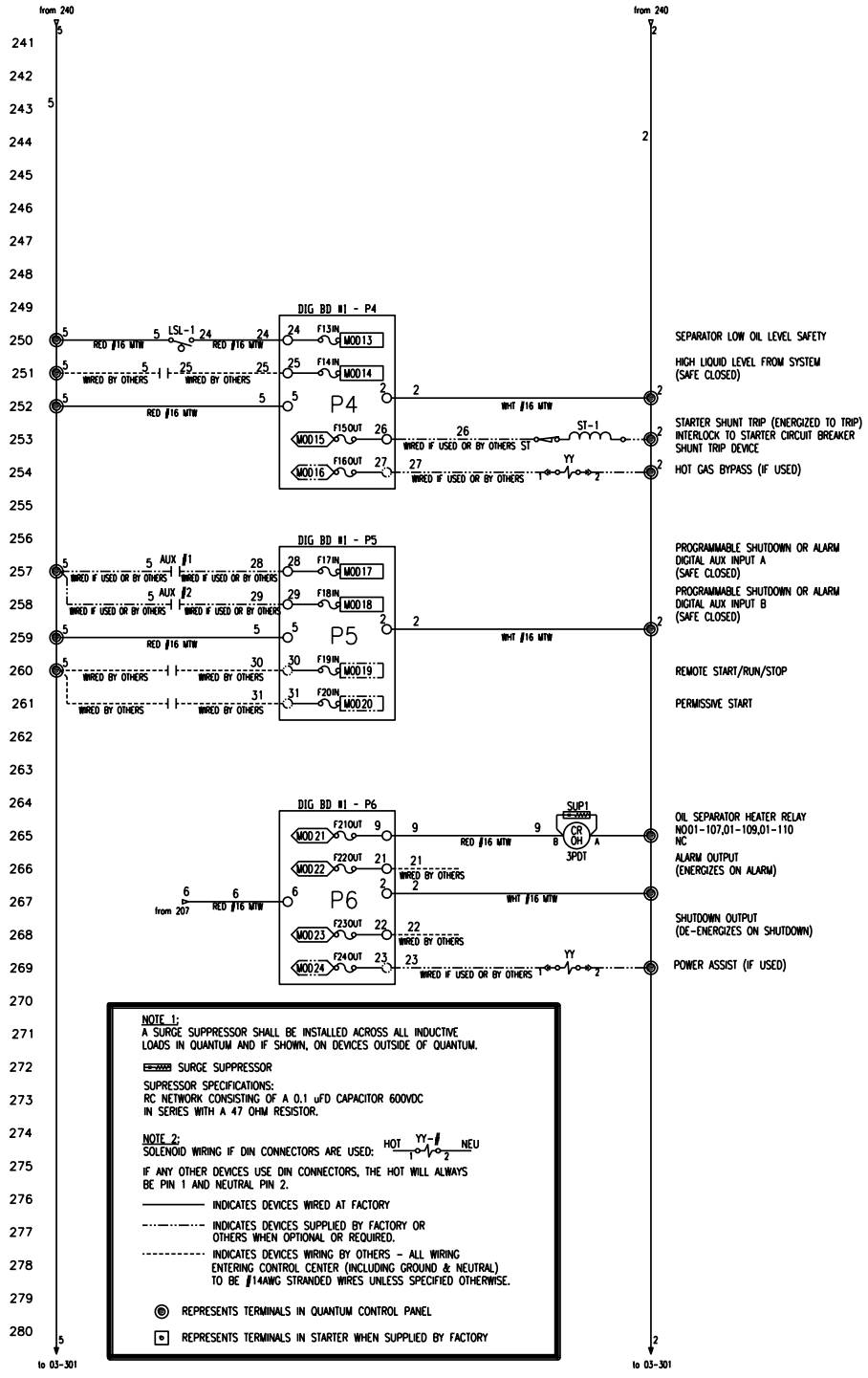
Figure 29b. RDB Wiring Diagram (3/6)


from 240
to 03-301
DIG BD #1 - P4
P4
MOD13
MOD14
MOD15
MOD16
SEPARATOR LOW OIL LEVEL SAFETY
HIGH LIQUID LEVEL FROM SYSTEM (SAFE CLOSED)
STARTER SHUNT TRIP (ENERGIZED TO TRIP) INTERLOCK TO STARTER CIRCUIT BREAKER SHUNT TRIP DEVICE
HOT GAS BYPASS (IF USED)
DIG BD #1 - P5
P5
MOD17
MOD18
MOD19
MOD20
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT A (SAFE CLOSED)
PROGRAMMABLE SHUTDOWN OR ALARM DIGITAL AUX INPUT B (SAFE CLOSED)
REMOTE START/RUN/STOP
PERMISSIVE START
DIG BD #1 - P6
P6
MOD21
MOD22
MOD23
MOD24
OIL SEPARATOR HEATER RELAY NO01-107,01-109,01-110 NC
ALARM OUTPUT (ENERGIZES ON ALARM)
SHUTDOWN OUTPUT (DE-ENERGIZES ON SHUTDOWN)
POWER ASSIST (IF USED)
NOTE 1:
A SURGE SUPPRESSOR SHALL BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.
SURGE SUPPRESSOR
SUPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A 0.1 uFD CAPACITOR 600VDC IN SERIES WITH A 47 OHM RESISTOR.
NOTE 2:
SOLENOID WIRING IF DIN CONNECTORS ARE USED:
IF ANY OTHER DEVICES USE DIN CONNECTORS, THE HOT WILL ALWAYS BE PIN 1 AND NEUTRAL PIN 2.
INDICATES DEVICES WIRED AT FACTORY
INDICATES DEVICES SUPPLIED BY FACTORY OR OTHERS WHEN OPTIONAL OR REQUIRED.
INDICATES DEVICES WIRING BY OTHERS - ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.
REPRESENTS TERMINALS IN QUANTUM CONTROL PANEL
REPRESENTS TERMINALS IN STARTER WHEN SUPPLIED BY FACTORY

090.040-WD0045.eps

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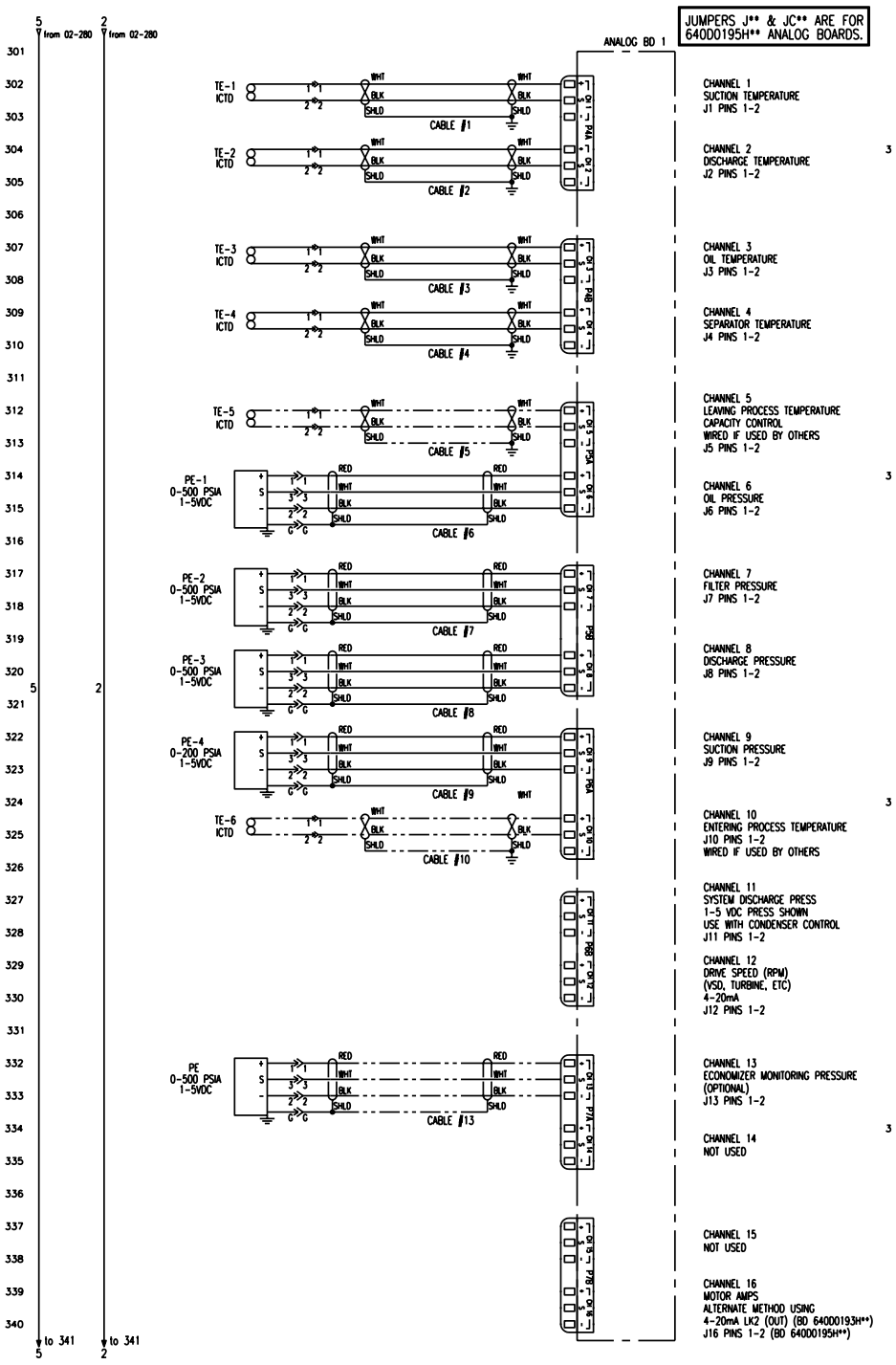
Figure 29c. RDB Wiring Diagram (4/6)



090.040-WD0046.eps

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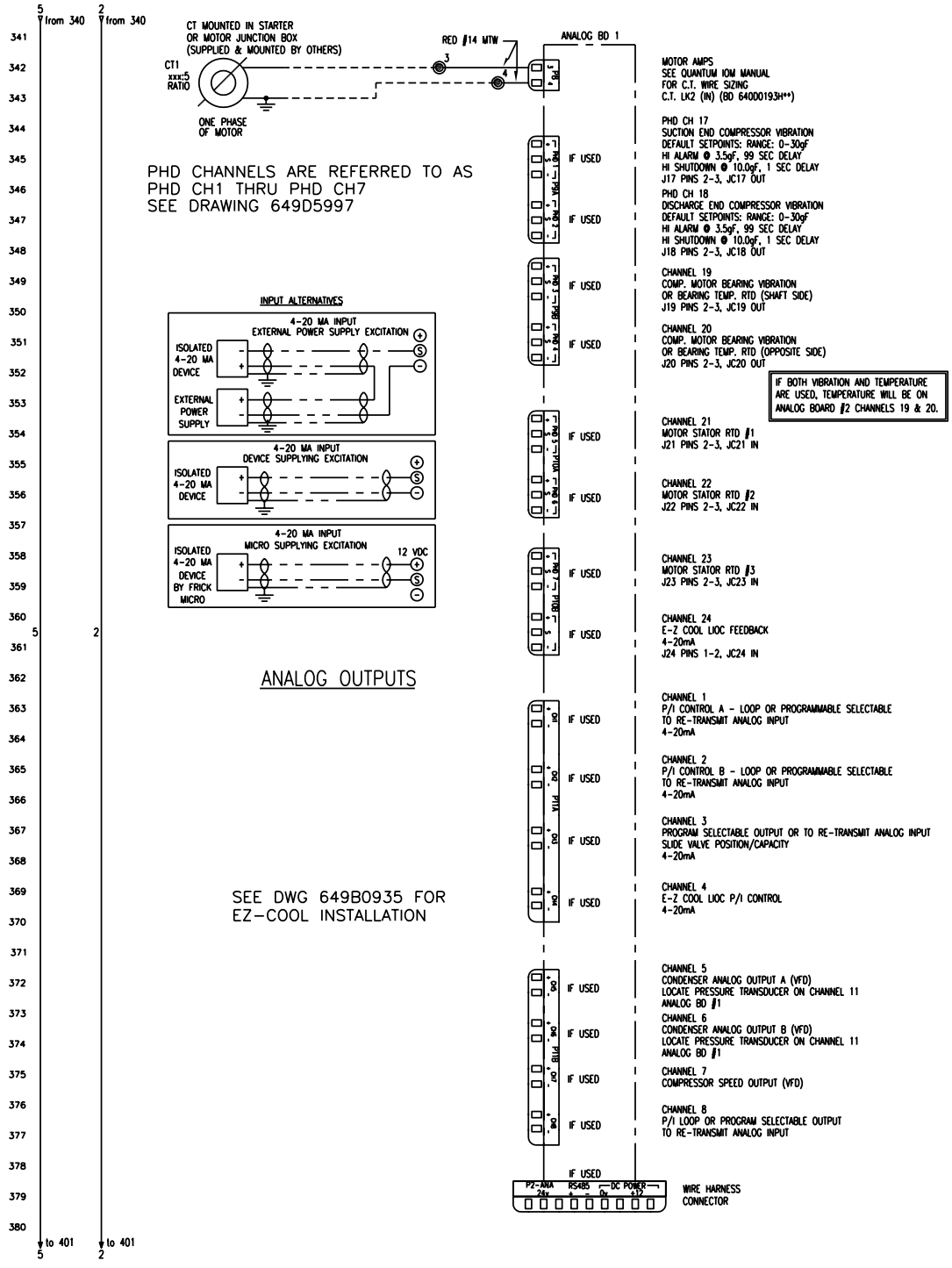
Figure 29d. RDB Wiring Diagram (5/6)



090.040-WD0047.eps

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Figure 29e. RDB Wiring Diagram (6/6)

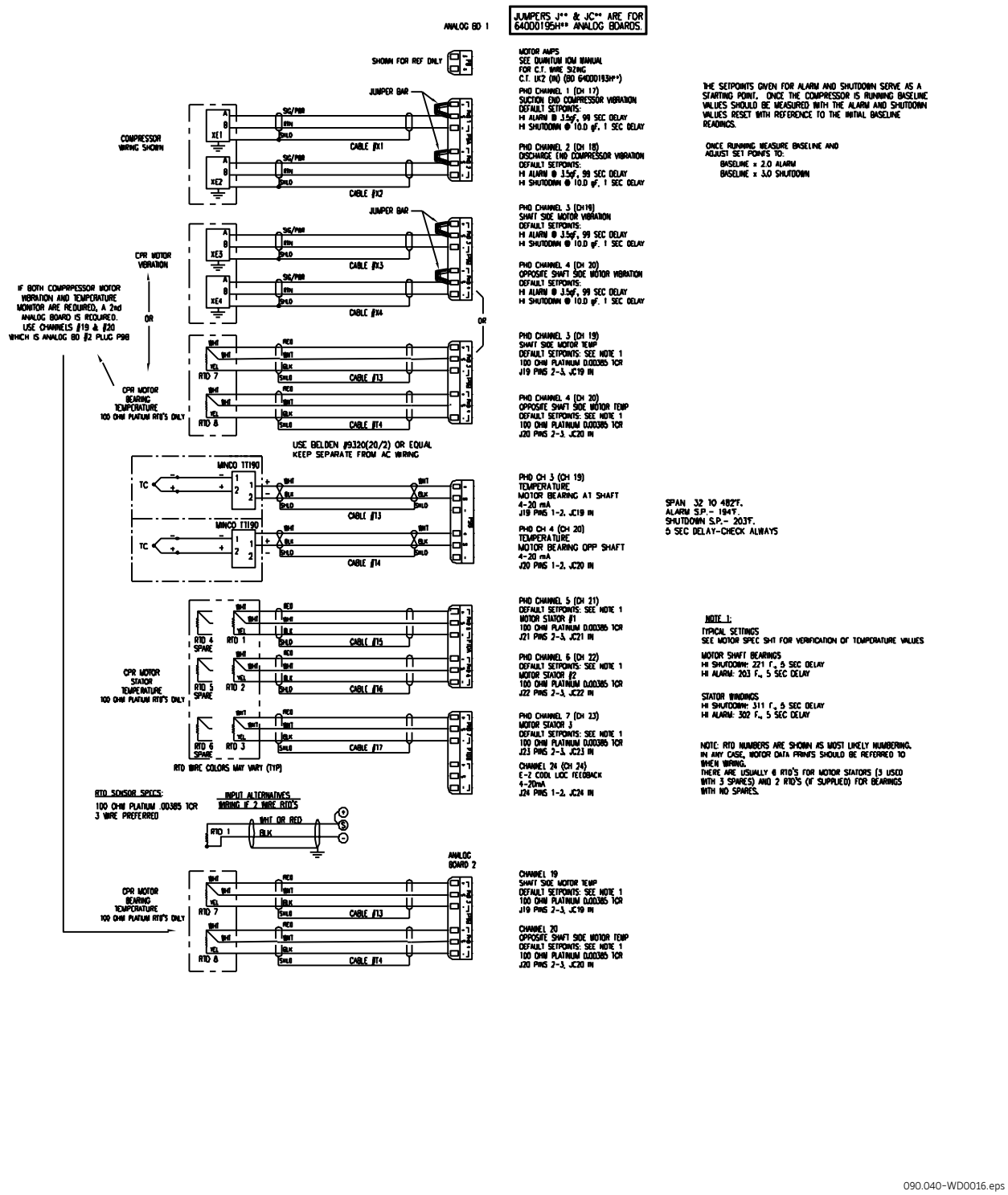
ANALOG BD 1
JUMPERS J** & JC** ARE FOR 64000195H** ANALOG BOARDS.
SHOWN FOR REF ONLY
MOTOR AMPS
SEE QUANTUM HOW MANUAL FOR C.T. WIRE SIZING
C.T. IK2 (IN) (BO 64000193H**)
JUMPER BAR
COMPRESSOR WIRING SHOWN
CABLE #X1
CABLE #X2
PHD CHANNEL 1 (CH 17)
SUCTION END COMPRESSOR VIBRATION
DEFAULT SETPOINTS:
HI ALARM @ 3.5gF, 99 SEC DELAY
HI SHUTDOWN @ 10.0 gF, 1 SEC DELAY
PHD CHANNEL 2 (CH 18)
DISCHARGE END COMPRESSOR VIBRATION
DEFAULT SETPOINTS:
HI ALARM @ 3.5gF, 99 SEC DELAY
HI SHUTDOWN @ 10.0 gF, 1 SEC DELAY
THE SETPOINTS GIVEN FOR ALARM AND SHUTDOWN SERVE AS A STARTING POINT. ONCE THE COMPRESSOR IS RUNNING BASELINE VALUES SHOULD BE MEASURED WITH THE ALARM AND SHUTDOWN VALUES RESET WITH REFERENCE TO THE INITIAL BASELINE READINGS.
ONCE RUNNING MEASURE BASELINE AND ADJUST SET POINTS TO:
BASELINE x 2.0 ALARM
BASELINE x 3.0 SHUTDOWN
CPR MOTOR VIBRATION
IF BOTH COMPRESSOR MOTOR VIBRATION AND TEMPERATURE MONITOR ARE REQUIRED, A 2nd ANALOG BOARD IS REQUIRED. USE CHANNELS #19 & #20 WHICH IS ANALOG BD #2 PLUG P98
OR
CABLE #X3
CABLE #X4
PHD CHANNEL 3 (CH19)
SHAFT SIDE MOTOR VIBRATION
DEFAULT SETPOINTS:
HI ALARM @ 3.5gF, 99 SEC DELAY
HI SHUTDOWN @ 10.0 gF, 1 SEC DELAY
PHD CHANNEL 4 (CH 20)
OPPOSITE SHAFT SIDE MOTOR VIBRATION
DEFAULT SETPOINTS:
HI ALARM @ 3.5gF, 99 SEC DELAY
HI SHUTDOWN @ 10.0 gF, 1 SEC DELAY
CPR MOTOR BEARING TEMPERATURE
100 OHM PLATINUM RTD'S ONLY
RTD 7
RTD 8
CABLE #T3
CABLE #T4
PHD CHANNEL 3 (CH 19)
SHAFT SIDE MOTOR TEMP
DEFAULT SETPOINTS: SEE NOTE 1
100 OHM PLATINUM 0.00385 TCR
J19 PINS 2-3, JC19 IN
PHD CHANNEL 4 (CH 20)
OPPOSITE SHAFT SIDE MOTOR TEMP
DEFAULT SETPOINTS: SEE NOTE 1
100 OHM PLATINUM 0.00385 TCR
J20 PINS 2-3, JC20 IN
USE BELDEN #9320(20/2) OR EQUAL
KEEP SEPARATE FROM AC WIRING
MINCO TT190
TC
CABLE #T3
CABLE #T4
PHD CH 3 (CH 19)
TEMPERATURE
MOTOR BEARING AT SHAFT
4-20 mA
J19 PINS 1-2, JC19 IN
PHD CH 4 (CH 20)
TEMPERATURE
MOTOR BEARING OPP SHAFT
4-20 mA
J20 PINS 1-2, JC20 IN
SPAN 32 TO 482°F.
ALARM S.P.- 194°F.
SHUTDOWN S.P.- 203°F.
5 SEC DELAY-CHECK ALWAYS
CPR MOTOR STATOR TEMPERATURE
100 OHM PLATINUM RTD'S ONLY
RTD 4 SPARE
RTD 1
RTD 5 SPARE
RTD 2
RTD 6 SPARE
RTD 3
CABLE #T5
CABLE #T6
CABLE #T7
RTD WIRE COLORS MAY VARY (TYP)
PHD CHANNEL 5 (CH 21)
DEFAULT SETPOINTS: SEE NOTE 1
MOTOR STATOR #1
100 OHM PLATINUM 0.00385 TCR
J21 PINS 2-3, JC21 IN
PHD CHANNEL 6 (CH 22)
DEFAULT SETPOINTS: SEE NOTE 1
MOTOR STATOR #2
100 OHM PLATINUM 0.00385 TCR
J22 PINS 2-3, JC22 IN
PHD CHANNEL 7 (CH 23)
MOTOR STATOR 3
DEFAULT SETPOINTS: SEE NOTE 1
100 OHM PLATINUM 0.00385 TCR
J23 PINS 2-3, JC23 IN
CHANNEL 24 (CH 24)
E-2 COOL LOC FEEDBACK
4-20mA
J24 PINS 1-2, JC24 IN
NOTE 1:
TYPICAL SETTINGS
SEE MOTOR SPEC SHT FOR VERIFICATION OF TEMPERATURE VALUES
MOTOR SHAFT BEARINGS
HI SHUTDOWN: 221 F., 5 SEC DELAY
HI ALARM: 203 F., 5 SEC DELAY
STATOR WINDINGS
HI SHUTDOWN: 311 F., 5 SEC DELAY
HI ALARM: 302 F., 5 SEC DELAY
NOTE: RTD NUMBERS ARE SHOWN AS MOST LIKELY NUMBERING. IN ANY CASE, MOTOR DATA PRINTS SHOULD BE REFERRED TO WHEN WIRING.
THERE ARE USUALLY 6 RTD'S FOR MOTOR STATORS (3 USED WITH 3 SPARES) AND 2 RTD'S (IF SUPPLIED) FOR BEARINGS WITH NO SPARES.
RTD SENSOR SPECS:
100 OHM PLATINUM .00385 TCR
3 WIRE PREFERRED
INPUT ALTERNATIVES
WIRING IF 2 WIRE RTD'S
WHT OR RED
BLK
RTD 1
ANALOG BOARD 2
CPR MOTOR BEARING TEMPERATURE
100 OHM PLATINUM RTD'S ONLY
RTD 7
RTD 8
CABLE #T3
CABLE #T4
CHANNEL 19
SHAFT SIDE MOTOR TEMP
DEFAULT SETPOINTS: SEE NOTE 1
100 OHM PLATINUM 0.00385 TCR
J19 PINS 2-3, JC19 IN
CHANNEL 20
OPPOSITE SHAFT SIDE MOTOR TEMP
DEFAULT SETPOINTS: SEE NOTE 1
100 OHM PLATINUM 0.00385 TCR
J20 PINS 2-3, JC20 IN
090.040-WD0016.eps

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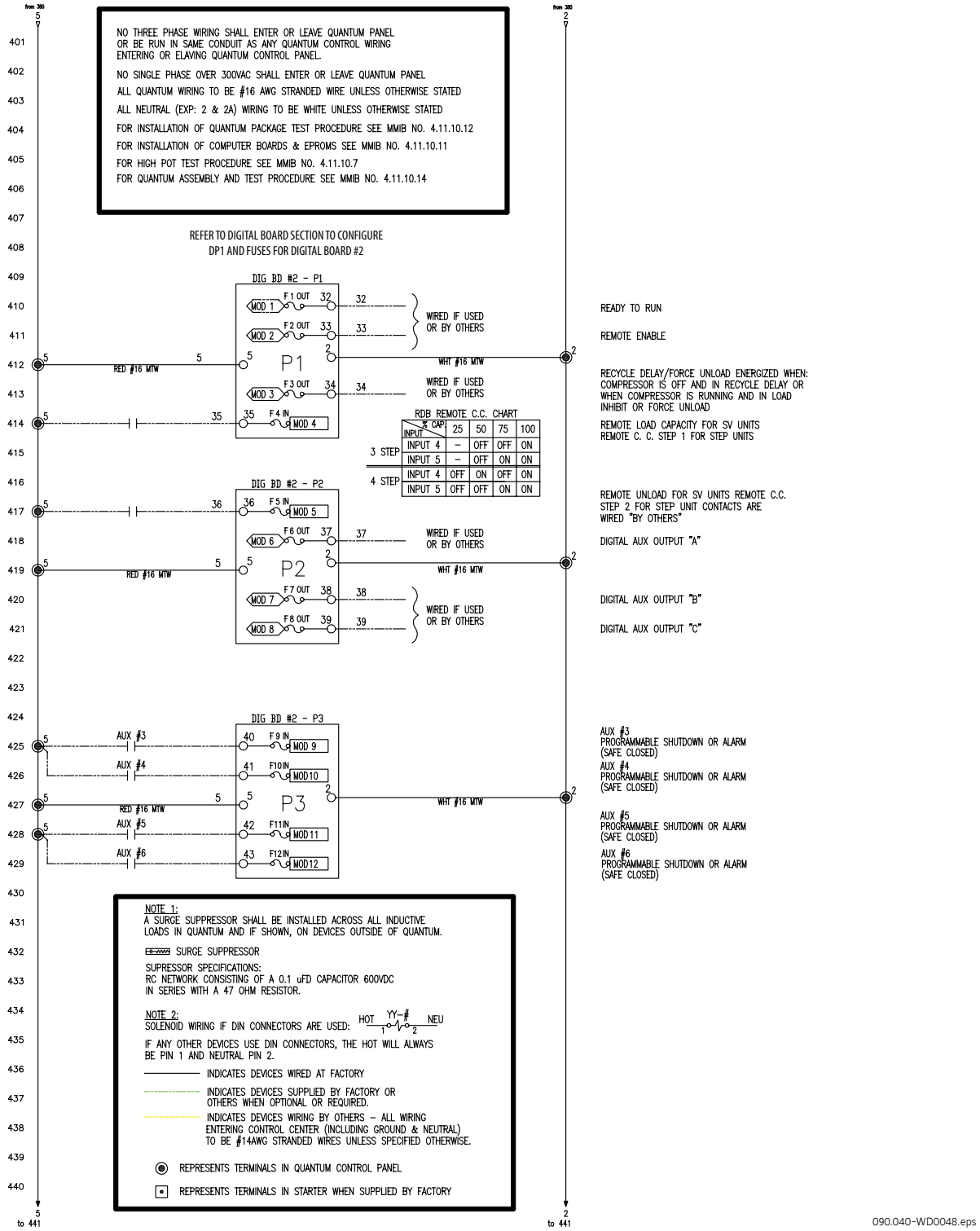
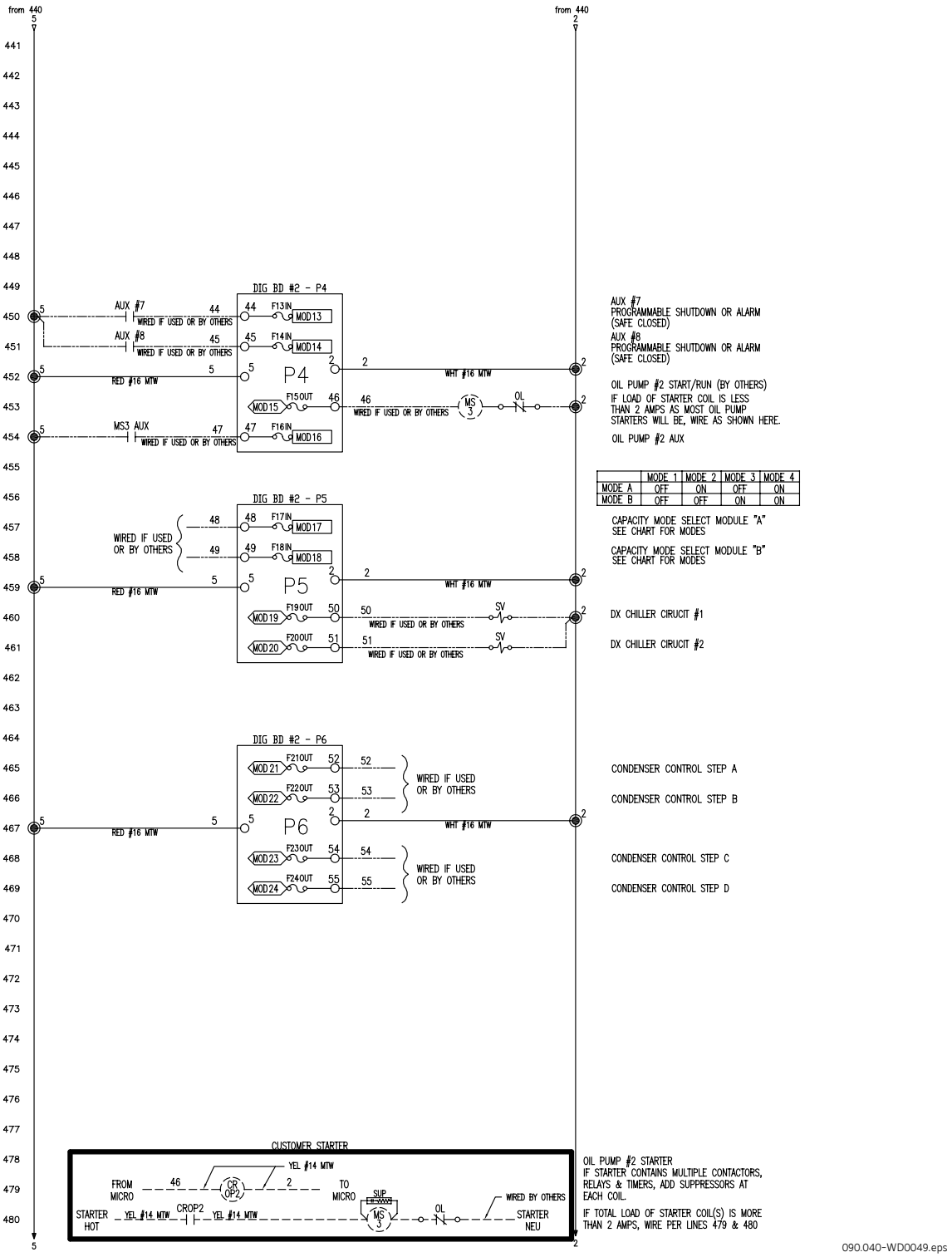
Figure 30.PhD Wiring Diagram


NO THREE PHASE WIRING SHALL ENTER OR LEAVE QUANTUM PANEL OR BE RUN IN SAME CONDUIT AS ANY QUANTUM CONTROL WIRING ENTERING OR ELAVING QUANTUM CONTROL PANEL.
NO SINGLE PHASE OVER 300VAC SHALL ENTER OR LEAVE QUANTUM PANEL
ALL QUANTUM WIRING TO BE #16 AWG STRANDED WIRE UNLESS OTHERWISE STATED
ALL NEUTRAL (EXP: 2 & 2A) WIRING TO BE WHITE UNLESS OTHERWISE STATED
FOR INSTALLATION OF QUANTUM PACKAGE TEST PROCEDURE SEE MMIB NO. 4.11.10.12
FOR INSTALLATION OF COMPUTER BOARDS & EPROMS SEE MMIB NO. 4.11.10.11
FOR HIGH POT TEST PROCEDURE SEE MMIB NO. 4.11.10.7
FOR QUANTUM ASSEMBLY AND TEST PROCEDURE SEE MMIB NO. 4.11.10.14
REFER TO DIGITAL BOARD SECTION TO CONFIGURE DP1 AND FUSES FOR DIGITAL BOARD #2
DIG BD #2 - P1
DIG BD #2 - P2
DIG BD #2 - P3
RDB REMOTE C.C. CHART
READY TO RUN
REMOTE ENABLE
RECYCLE DELAY/FORCE UNLOAD ENERGIZED WHEN: COMPRESSOR IS OFF AND IN RECYCLE DELAY OR WHEN COMPRESSOR IS RUNNING AND IN LOAD INHIBIT OR FORCE UNLOAD
REMOTE LOAD CAPACITY FOR SV UNITS REMOTE C. C. STEP 1 FOR STEP UNITS
REMOTE UNLOAD FOR SV UNITS REMOTE C.C. STEP 2 FOR STEP UNIT CONTACTS ARE WIRED "BY OTHERS"
DIGITAL AUX OUTPUT "A"
DIGITAL AUX OUTPUT "B"
DIGITAL AUX OUTPUT "C"
AUX #3 PROGRAMMABLE SHUTDOWN OR ALARM (SAFE CLOSED)
AUX #4 PROGRAMMABLE SHUTDOWN OR ALARM (SAFE CLOSED)
AUX #5 PROGRAMMABLE SHUTDOWN OR ALARM (SAFE CLOSED)
AUX #6 PROGRAMMABLE SHUTDOWN OR ALARM (SAFE CLOSED)
WIRED IF USED OR BY OTHERS
RED #16 MTW
WHT #16 MTW
NOTE 1:
A SURGE SUPPRESSOR SHALL BE INSTALLED ACROSS ALL INDUCTIVE LOADS IN QUANTUM AND IF SHOWN, ON DEVICES OUTSIDE OF QUANTUM.
SURGE SUPPRESSOR
SUPRESSOR SPECIFICATIONS:
RC NETWORK CONSISTING OF A 0.1 uFD CAPACITOR 600VDC IN SERIES WITH A 47 OHM RESISTOR.
NOTE 2:
SOLENOID WIRING IF DIN CONNECTORS ARE USED: HOT YY-# NEU
IF ANY OTHER DEVICES USE DIN CONNECTORS, THE HOT WILL ALWAYS BE PIN 1 AND NEUTRAL PIN 2.
INDICATES DEVICES WIRED AT FACTORY
INDICATES DEVICES SUPPLIED BY FACTORY OR OTHERS WHEN OPTIONAL OR REQUIRED.
INDICATES DEVICES WIRING BY OTHERS – ALL WIRING ENTERING CONTROL CENTER (INCLUDING GROUND & NEUTRAL) TO BE #14AWG STRANDED WIRES UNLESS SPECIFIED OTHERWISE.
REPRESENTS TERMINALS IN QUANTUM CONTROL PANEL
REPRESENTS TERMINALS IN STARTER WHEN SUPPLIED BY FACTORY
090.040-WD0048.eps

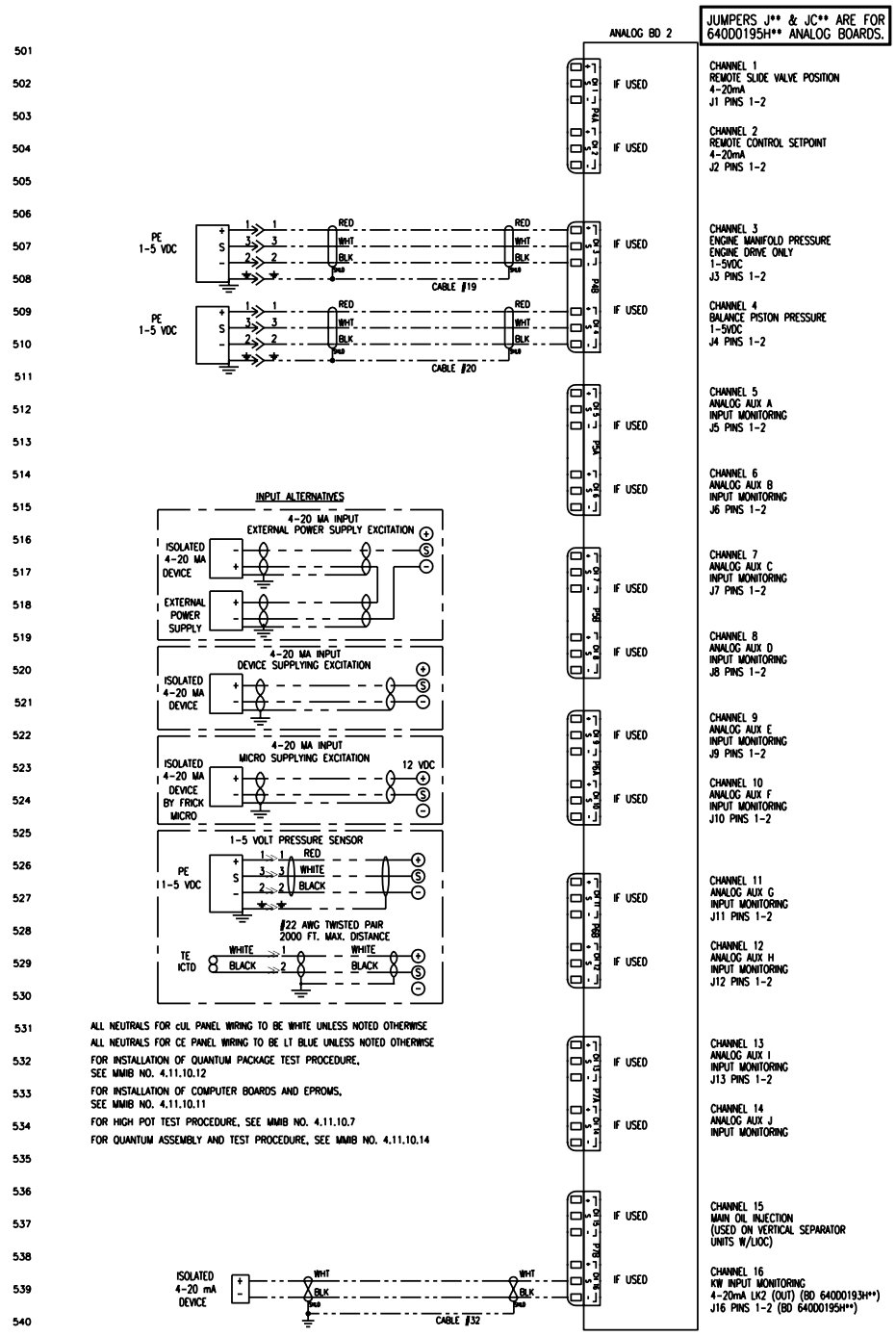
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 31. Digital I/O Board #2 Wiring Diagram (1/2)



This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

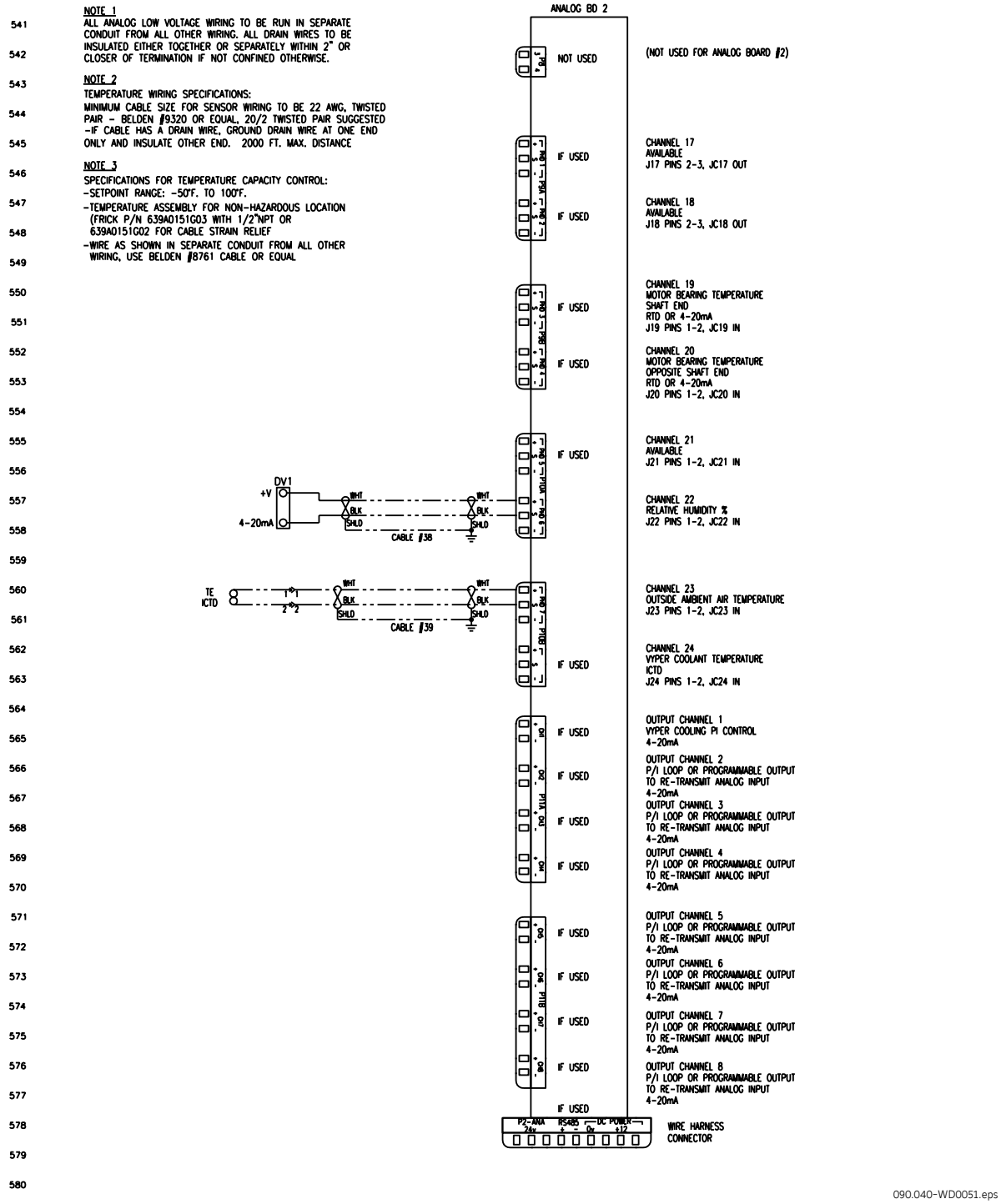
Figure 31a. Digital I/O Board #2 Wiring Diagram (2/2)



090.040-WD0050.eps

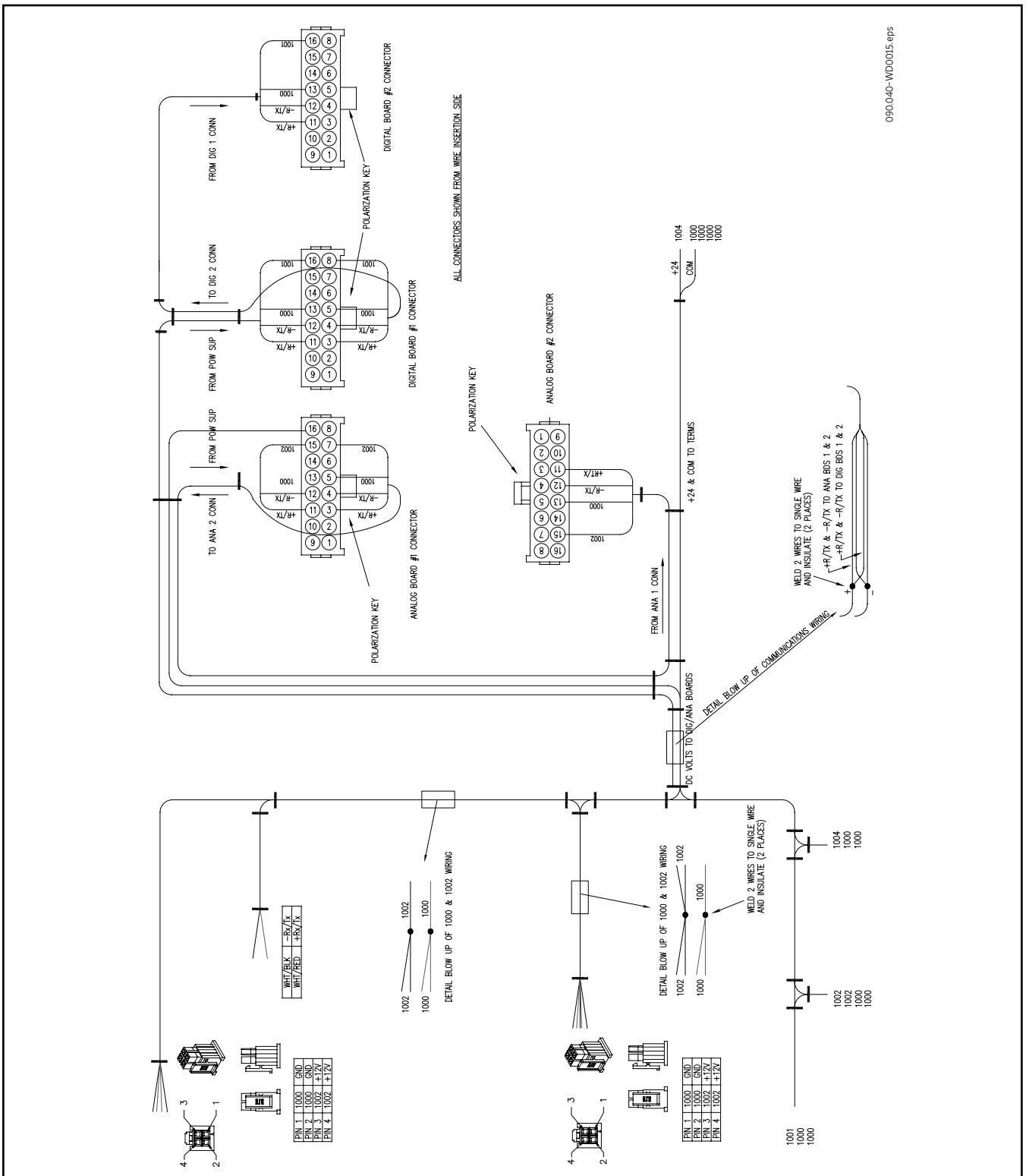
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 32. Analog I/O Board #2 Wiring Diagram (1/2)



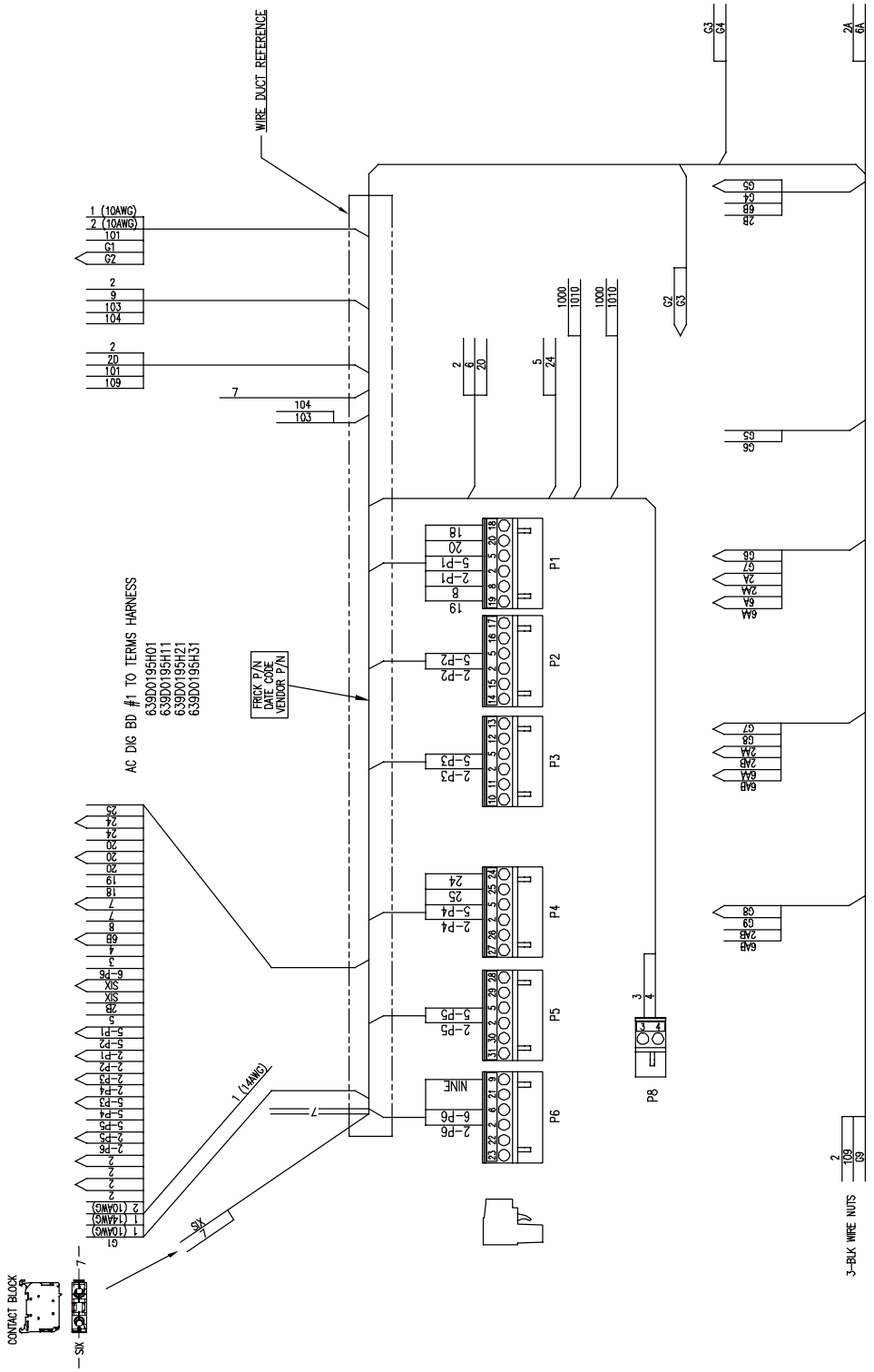
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 32a. Analog I/O Board #2 Wiring Diagram (2/2)


090.040-WD0015.eps
ALL CONNECTORS SHOWN FROM WIRE INSERTION SIDE
DIGITAL BOARD #2 CONNECTOR
DIGITAL BOARD #1 CONNECTOR
ANALOG BOARD #1 CONNECTOR
ANALOG BOARD #2 CONNECTOR
POLARIZATION KEY
FROM DIG 1 CONN
TO DIG 2 CONN
FROM POW SUP
TO ANA 2 CONN
+24
COM
+24 & COM TO TERMS
FROM ANA 1 CONN
DC VOLTS TO DIG/ANA BOARDS
DETAIL BLOW UP OF COMMUNICATIONS WIRING
WELD 2 WIRES TO SINGLE WIRE AND INSULATE (2 PLACES)
+R/TX & -R/TX TO ANA BDS 1 & 2
+R/TX & -R/TX TO DIG BDS 1 & 2
DETAIL BLOW UP OF 1000 & 1002 WIRING
WHT/BLK -Rx/Tx
WHT/RED +Rx/Tx
PIN 1 1000 GND
PIN 2 1000 GND
PIN 3 1002 +12V
PIN 4 1002 +12V

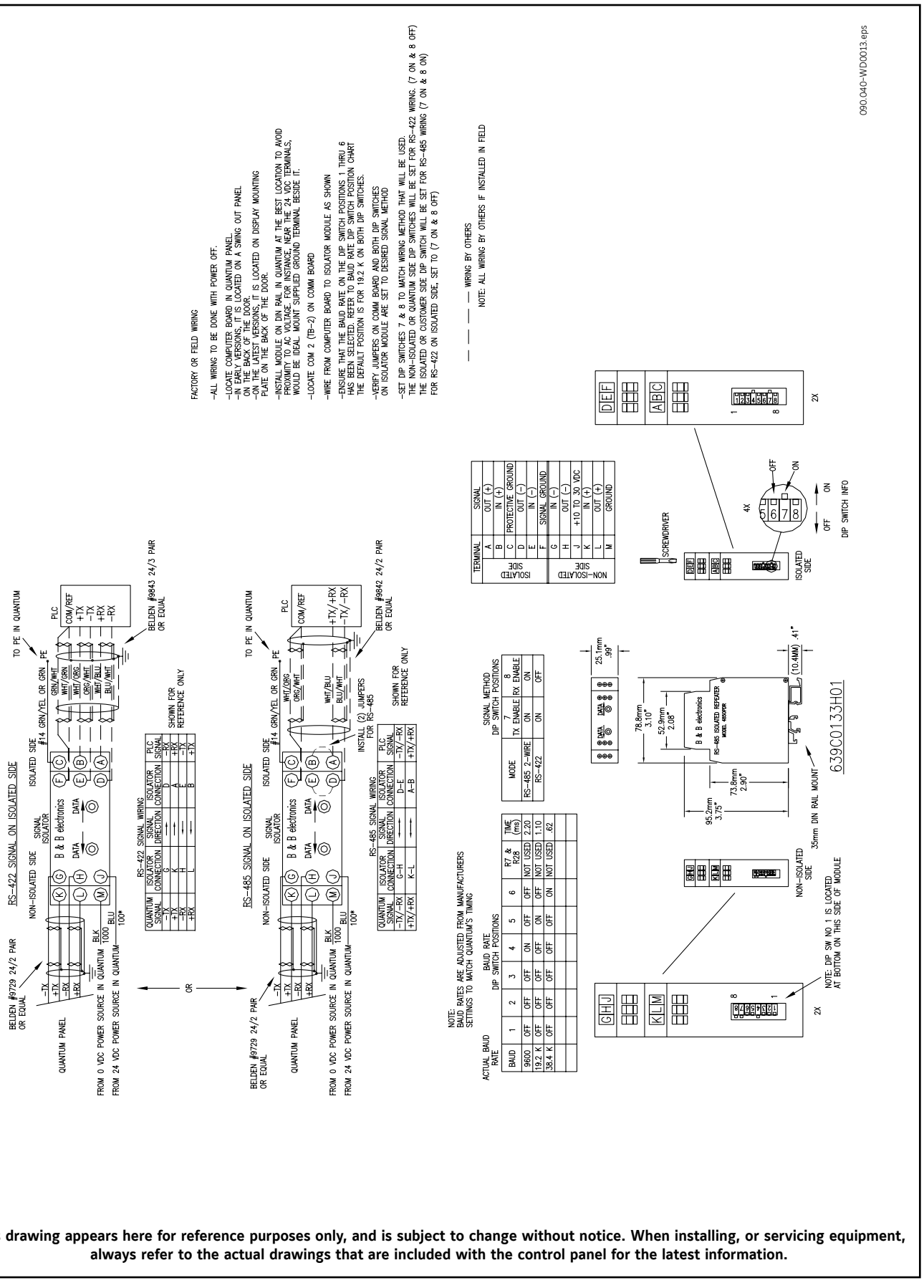
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 33. HD AC Power Harness



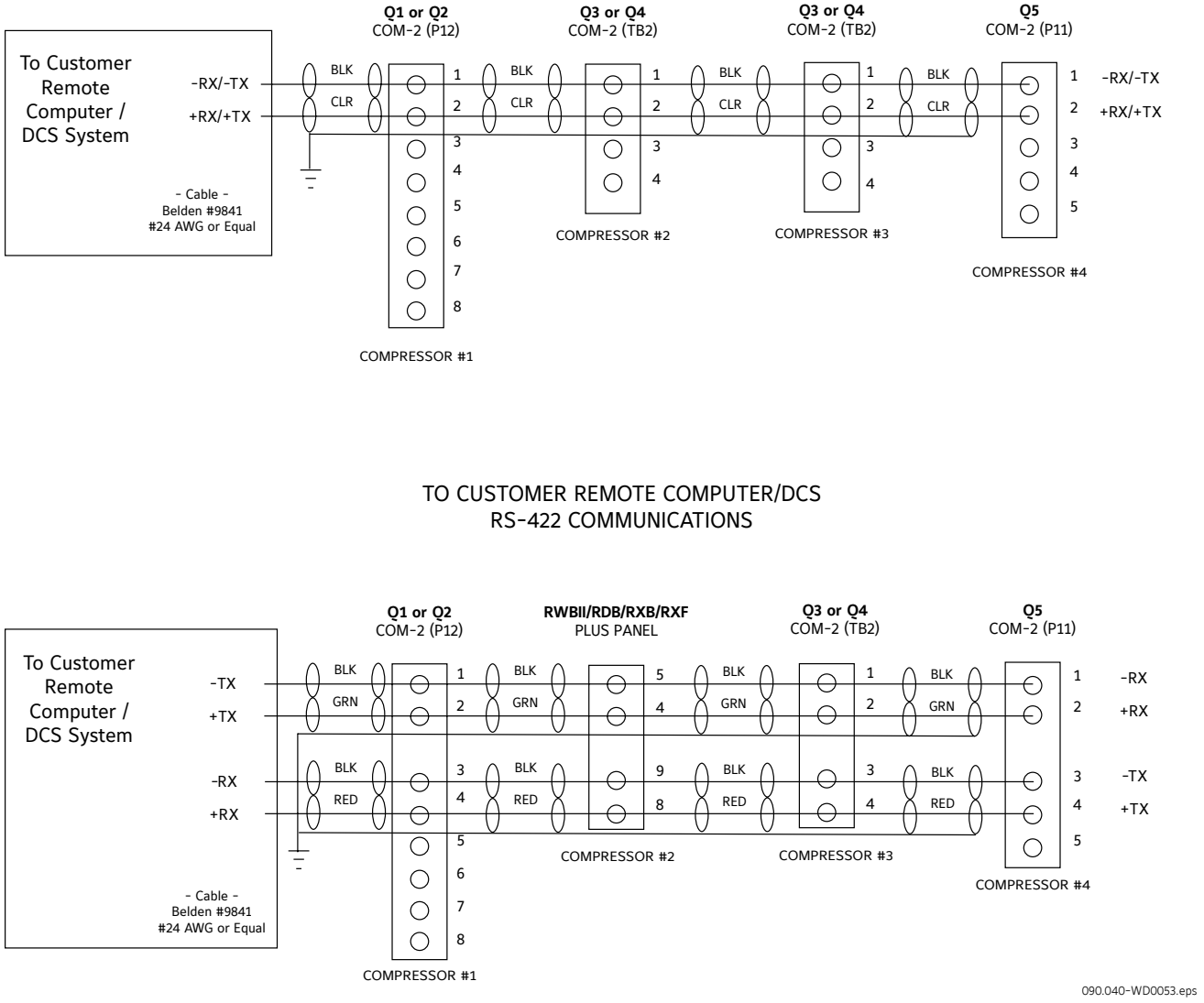
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 33a. HD AC Power Harness (Digital Board #2)


RS-422 SIGNAL ON ISOLATED SIDE
RS-485 SIGNAL ON ISOLATED SIDE
FACTORY OR FIELD WIRING
NOTE: ALL WIRING BY OTHERS IF INSTALLED IN FIELD
090.040-WD0013.eps

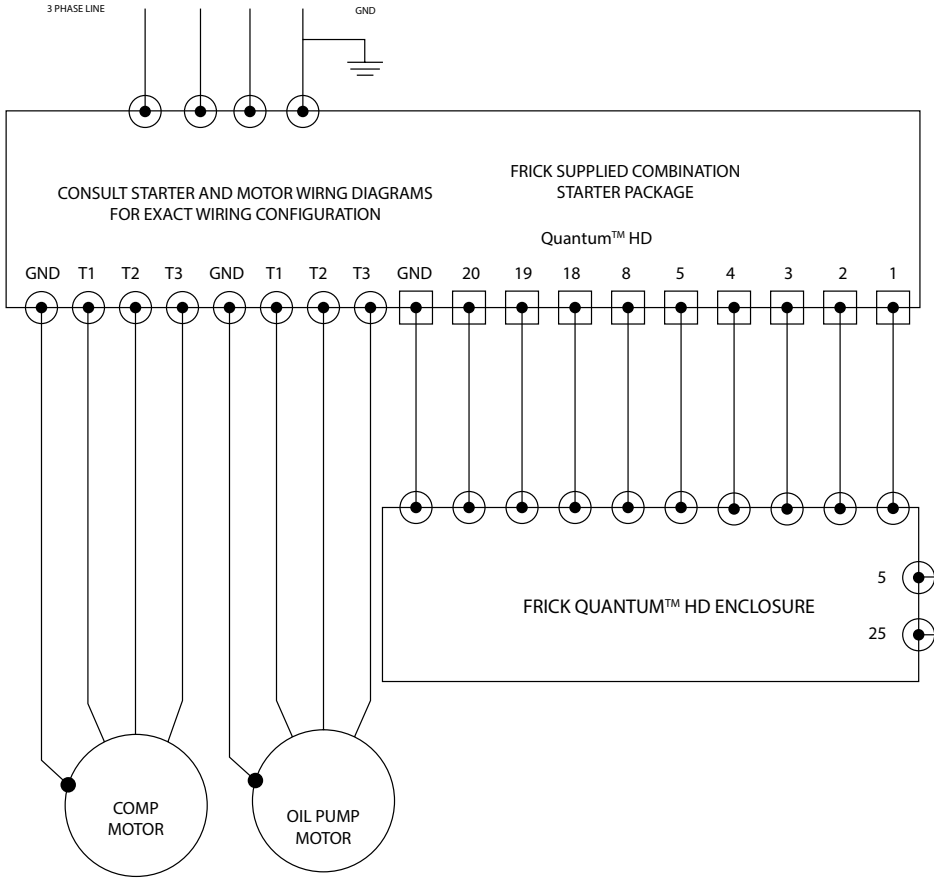
This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 34. Isolater Repeater Module (Isolates Communication Signals)



This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 35. Communications Wiring Diagrams (RS-485 & RS-422)



NOTES:

1. REFER TO MOTOR NAMEPLATE FOR CORRECT MOTOR CONNECTION.
2. SEPARATE CONDUIT RUNS FOR CONTROL VOLTAGE WIRING AND MOTOR CONNECTION WIRING.
3. CONDUIT GROUNDS ARE NOT ACCEPTABLE.
4. ALL WIRING MUST BE PER LATEST EDITION OF THE NEC AND LOCAL CODES.
5. ALL CONTROL VOLTAGE WIRING TO BE 14 AWG STRANDED.

090.040-WD0052.eps

***(Refer to Frick publication 090.400-SB for installation guidelines)**

This drawing appears here for reference purposes only, and is subject to change without notice. When installing, or servicing equipment, always refer to the actual drawings that are included with the control panel for the latest information.

Figure 36. Point-To-Point Field Wiring Diagram

NOTES

SECTION 10

ADDITIONAL TABLES

Table 16. Pressure Transducer Conversation Data (Data Instruments Model SA)

Sensor Voltage	100 psi Range - psig*		200 psi Range - psig*		300 psi Range - psig*		500 psi Range - psig*	
	Low	High	Low	High	Low	High	Low	High
1.0	29.92"	19.74"	29.92"	9.57"	29.92"	7.0"	29.92"	4.1
1.1	29.92"	14.65"	29.92"	0.3	29.92"	4.1	29.92"	16.6
1.2	29.92"	9.57"	29.92"	5.3	22.3"	11.6	17.1"	29.1
1.3	24.83"	4.48"	19.74"	10.3	7.0"	19.1	4.1	41.6
1.4	19.74"	0.3	9.57"	15.3	4.1	26.6	16.6	54.1
1.5	14.65"	2.8	0.3	20.3	11.6	34.1	29.1	66.6
1.6	9.57"	5.3	5.3	25.3	19.1	41.6	41.6	79.1
1.7	4.48"	7.8	10.3	30.3	26.6	49.1	54.1	91.6
1.8	0.3	10.3	15.3	35.3	34.1	56.6	66.6	104.1
1.9	2.8	12.8	20.3	40.3	41.6	64.1	79.1	116.6
2.0	5.3	15.3	25.3	45.3	49.1	71.6	91.6	129.1
2.1	7.8	17.8	30.3	50.3	56.6	79.1	104.1	141.6
2.2	10.3	20.3	35.3	55.3	64.1	86.6	116.6	154.1
2.3	12.8	22.8	40.3	60.3	71.6	94.1	129.1	166.6
2.4	15.3	25.3	45.3	65.3	79.1	101.6	141.6	179.1
2.5	17.8	27.8	50.3	70.3	86.6	109.1	154.1	191.6
2.6	20.3	30.3	55.3	75.3	94.1	116.6	166.6	204.1
2.7	22.8	32.8	60.3	80.3	101.6	124.1	179.1	216.6
2.8	25.3	35.3	65.3	85.3	109.1	131.6	191.6	229.1
2.9	27.8	37.8	70.3	90.3	116.6	139.1	204.1	241.6
3.0	30.3	40.3	75.3	95.3	124.1	146.6	216.6	254.1
3.1	32.8	42.8	80.3	100.3	131.6	154.1	229.1	266.6
3.2	35.3	45.3	85.3	105.3	139.1	161.6	241.6	279.1
3.3	37.8	47.8	90.3	110.3	146.6	169.1	254.1	291.6
3.4	40.3	50.3	95.3	115.3	154.1	176.6	266.6	304.1
3.5	42.8	52.8	100.3	120.3	161.6	184.1	279.1	316.6
3.6	45.3	55.3	105.3	125.3	169.1	191.6	291.6	329.1
3.7	47.8	57.8	110.3	130.3	176.6	199.1	304.1	341.6
3.8	50.3	60.3	115.3	135.3	184.1	206.6	316.6	354.1
3.9	52.8	62.8	120.3	140.3	191.6	214.1	329.1	366.6
4.0	55.3	65.3	125.3	145.3	199.1	221.6	341.6	379.1
4.1	57.8	67.8	130.3	150.3	206.6	229.1	354.1	391.6
4.2	60.3	70.3	135.3	155.3	214.1	236.6	366.6	404.1
4.3	62.8	72.8	140.3	160.3	221.6	244.1	379.1	416.6
4.4	65.3	75.3	145.3	165.3	229.1	251.6	391.6	429.1
4.5	67.8	77.8	150.3	170.3	236.6	259.1	404.1	441.6
4.6	70.3	80.3	155.3	175.3	244.1	266.6	416.6	454.1
4.7	72.8	82.8	160.3	180.3	251.6	274.1	429.1	466.6
4.8	75.3	85.3	165.3	185.3	259.1	281.6	441.6	479.1
4.9	77.8	87.8	170.3	190.3	266.6	289.1	454.1	491.6
5.0	80.3	90.3	175.3	195.3	274.1	296.6	466.6	504.1
At zero psig	**1.388 V**	**1.788 V**	**1.094 V**	**1.494 V**	**1.046 V**	**1.346 V**	**0.968 V**	**1.268 V**

*** Below 0 psig measured in inches of mercury.**

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Table 17. Compressor Volume Ratio & Capacity Information

Bare Model	Package Model	Bare Model Serial Number	Standard Slide Valve		Low Vi Slide Valve		Theo-retical Minimum Capacity	Micro Slide Valve Travel	Micro Slide Stop Travel
			Min. Vi	Max. Vi	Min. Vi	Max. Vi			
XJS/XJF 95	RXB/RXF 12, 15, 19	all	2.2, 3.5, 5.0		n/a	n/a	25%		
XJS/XJF 120	RXB/RXF 24,30, 39, 50	all	2.2, 3.5, 5.0		n/a	n/a	25%		
XJF/XJB 151 & 151X	RXF 58, 68, 85, 101	all	2.2, 3.5, 5.0		n/a	n/a	21%		
TDSH 163S	RWB-II 60	all	2.2	5.0	n/a	n/a	12%	195.6	76.2
TDSH 163L	RWB-II 38, 76	all	2.2	5.0	n/a	n/a	12%	195.6	76.2
TDSH 193S	RWB-II 100	all	2.2	5.0	1.7	n/a	12%	195.6	76.2
TDSH 193L	RWB-II 134	all	2.2	5.0	1.7	n/a	12%	195.6	76.2
TDSH 233S	RWB-II 177	all	2.2	5.0	1.7	n/a	12%	195.6	76.2
TDSH 233L	RWB-II 222	all	2.2	5.0	1.7	n/a	12%	195.6	76.2
TDSH 233XL	RWB-II 270	all	2.2	5.0	1.7	n/a	23%	158.6	76.2
TDSH 283S	RWB-II 316	all	2.2	5.0	1.7	n/a	12%	195.6	76.2
TDSH 283L	RWB-II 399	all	2.2	5.0	1.7	n/a	12%	195.6	76.2
TDSH 283LY	YS chiller (S7 compressor)	all	n/a	n/a	1.7	2.5	8%	194.1	56.5
TDSH 283SX	RWB-II 480	all	2.2	4.2	1.7	2.7	23%	165.5	64.8
TDSH/TDSB 355S	RWB-II 496	0153L / 0011SBS and lower	2.2	5.0	1.7	3.0	18%	185.6	76.2
TDSH/TDSB 355S	RWB-II 496	0154L / 0012SBS and higher	2.2	5.0	1.7	3.0	12%	213.9	76.2
TDSH/TDSB 355L	RWB-II 676	0222K / 0025SBL and lower	2.2	5.0	1.7	3.0	18%	185.6	76.2
TDSH/TDSB 355L	RWB-II 676	0223K / 0026SBL and higher	2.2	5.0	1.7	3.0	12%	213.9	76.2
TDSH/TDSB 355XL	RWB-II 856	0109XL / 0052SBXL and lower	2.2	5.0	1.7	3.0	30%	146.5	76.2
TDSH/TDSB 355XL	RWB-II 856	0110XL / 0053SBXL and higher	2.2	5.0	1.7	3.0	18%	184.6	76.2
TDSB 355U	RWB-II 1080	all	2.4	4.5	1.7	2.6	26%	141.5	58.0
TDSH 408S	RWH-II 852	all	2.2	5.0	1.7	3.0	12%	193.0	76.2
TDSH 408L	RWH-II 1179	all	2.2	5.0	1.7	3.0	12%	193.0	76.2
TDSH 408XL	RWH-II 1395	all	2.2	4.3	1.7	2.7	15%	183.9	66.4
API 408S		all	2.2	5.0	1.7	3.0	12%	193.0	76.2
API 408L		all	2.2	5.0	1.7	3.0	12%	193.0	76.2
API 408XL		all	2.2	4.3	1.7	2.7	21%	163.4	66.4
SGC 1913	RWF 100	all	2.2	5.0	1.7	3.0	12%	195.6	76.2
SGC 1918	RWF 134	all	2.2	5.0	1.7	3.0	12%	195.6	76.2
SGC 2313	RWF 177	all	2.2	5.0	1.7	3.0	12%	195.6	76.2
SGC 2317	RWF 222	all	2.2	5.0	1.7	3.0	12%	195.6	76.2
SGC 2321	RWF 270	all	2.2	5.0	1.7	3.0	12%	195.6	76.2
SGC 2813	RWF 316	all	2.2	5.0	1.7	3.0	12%	195.6	76.2
SGC 2817	RWF 399	all	2.2	5.0	1.7	3.0	12%	195.6	76.2
SGC 2821	RWF 480	all	2.2	5.0	1.7	3.0	12%	213.9	76.2
SGC 2824	RWF 546	all	2.0	4.1	n/a	n/a	18%	185.6	76.2
SGC 3511	RWF-II 496	all	2.2	5.0	1.7	3.0	12%	213.9	76.2
SGC 3515	RWF-II 676	all	2.2	5.0	1.7	3.0	12%	213.9	76.2
SGC 3519	RWF-II 856	all	2.2	5.0	1.7	3.0	18%	184.6	76.2
SGC 3524	RWF-II 1080	all	2.4	4.5	1.7	2.6	26%	141.5	58.0
NGC 100		all	2.2	5.0	1.7	3.0	12%	195.6	76.2
NGC 150		all	2.2	5.0	1.7	3.0	12%	195.6	76.2
NGC 200		all	2.2	5.0	1.7	3.0	12%	195.6	76.2
NGC 250		all	2.2	5.0	1.7	3.0	12%	195.6	76.2
NGC 300		all	2.0	4.1	n/a	n/a	15%	197.3	76.2
NGC 400		all	2.2	5.0	n/a	n/a	12%	213.9	76.2
NGC 450		NGC 450E0001Z only	2.0	3.3	n/a	n/a	26%	141.5	58.0
NGC 450		All NGC 450 except E0001Z	2.2	3.9	n/a	n/a	26%	141.5	58.0

NOTE: For 95, 120, and 151mm compressors, the slide stop travel value in parentheses is the travel from Vi=2.2 to Vi=3.5.

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SECTION 11

CONTROL PANEL REPLACEMENT PARTS LIST

Table 18. HD Compressor Control Replacements Parts List

Frick Number	SAP Number	Description
		Analog Boards
640C0062G01	1107799	"614" Analog Board #1 (Replaces existing 32 channel board #1 only - no hardware)
640C0062G02	1107800	"614" Analog Board #2 (Replaces existing 32 channel board #2 only - no hardware)
		Circuit Breakers
639A0206H10	484043	5 Amp circuit breaker
639A0206H10	484050	10 Amp circuit breaker
639A0206H12	484053	15 Amp circuit breaker
		Connectors
649A1027G14	643440	2- Pole connector (P8 - Analog Board)
649A1027G11	485874	Connector kit for Input Ch. 1-16 (Analog Board)
649A1027G21	643460	Connector kit for Input Ch. 17-24, and Output Ch. 1-8 (Analog Board)
649A1027G31	643461	Connector for Power/Communications for Analog Board
		Control Power
333Q0001418	467096	Filter, Line
333Q0001191	467024	Hour meter
639A0185H10	483963	2-Pos. Selector Switch (Control Power)
639A0185H30	483966	Latch, 3 Across (Attaches contact block to switch mechanism)
639A0185H31	483967	Normally Open Contact Block (for Control Power Switch)
639B0120H51	680313	Socket, Guarded, DPDT
639B0114H51	580348	Socket, Guarded, 3PDT
639B0114H98	580349	Spring Clip Hold Down
639B0120H01	680049	Relay, Control 24VDC, DPDT
639B0120H11	680311	Relay, Control 120VAC, DPDT
639B0120H21	680312	Relay, Control 240VAC, DPDT
639B0114H02	580342	Relay, Control 24VDC, 3PDT
639B0114H12	580345	Relay, Control 120VAC, 3PDT
639B0114H22	580347	Relay, Control 240VAC, 3PDT
639A0243H02	817257	Surge suppresser
		Digital Boards
333Q0001172	467015	Output Module, 24 VDC
111Q0281061	455056	Output Module, 24-280 VAC
333Q0001171	467014	Input Module, 24 VDC
333Q0000116	466842	Input Module, 120 VAC
333Q0000789	466949	Input Module, 230 VAC
333Q0001326	467073	Fuse, 5 amp, 250 V
640C0024G01	484494	Digital Board #1 (Replaces existing board only - no hardware)
640C0024G02	484495	Digital Board #2 (Replaces existing board only - no hardware)
649D5948G01	826167	Digital Board #2 (Field Upgrade Kit- adds a second digital board)

*** Based upon system voltage**

		Display Accessories
639D0199H01	703164	15" Color Display (Indoor)
639D0199H11	845829	15" Color Display (Outdoor)
649D6101G01	1032704	Field Replacement Touchscreen glass w/overlay of Frick logo (Keypad has been eliminated)
		Fans
649A0906G13	509129	Internal Circulation Fan, Field Install, 24 VDC
649A0906G11	485514	Internal Circulation Fan, Field Install, 115 VAC
649A0906G12	N/A	Internal Circulation Fan, Field Install, 220 VAC
		Flash Cards and Software
649A1104Gxx	831157	Quantum HD Program Flash Card (Version 10.xx, the "xx" indicates program revision)
649A1063G99	485995	Quantum HD Setpoint Saver (USB Drive)
		Harnesses
639D0204H01	716617	DC power-I/O Comms harness
639D0203H01	716615	AC harness for digital board # 1
639D0203H02	716616	AC harness for digital board # 2
639B0118H01	670744	Display Harness
639B0126H01	884854	LED Inverter Harness
639D0191H03	696516	Harness Kit, Q5 to Interface Board Interconnect
		Miscellaneous
333Q0001786	886046	Battery, 3V (located on Q5 board)
639C0143H01	670593	Q5 mounting plate (hardware not included)
		Panel Heaters
640M0007G16	484626	200 W, 115 VAC
640M0007G18	484627	400 W, 115 VAC
640M0007G27	484632	200 W, 220 VAC
640M0007G21	484629	400 W, 220 VAC
		Power Supply
639B0115H01	642307	DC power supply - 5 VDC
639B0115H02	642308	DC power supply - 12 VDC
639B0115H03	642309	DC power supply - 24 VDC
		Q5 Boards
649C1158G01	1034948	Q5 (Advantech Q5) (Does not include interconnect harness kit)
639B0116H01	677556	Interface Board (Does not include interconnect harness kit)

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Table 19. Remanufactured Parts

Frick Number	SAP Number	Description
640C0024S01	N/A	Digital I/O Board

090.040-TB0019.indd

NOTES

April 2015 Form Revisions

p.3,4– Updated Fig./Table list with PDF hyperlink functionality
p.114– Updated SAP 1032704 and 677556 line item part numbers

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